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Ministry of Transport,
4, Whitehall Gardens,
London, S.W.1.
15th August, 1935.

SIR,

I have the honour to report, for the information of the Minister of Transport, in accordance with the Order of the 17th June, the result of my Inquiry into the circumstances attending the accident which occurred at about 11.27 p.m. on Saturday, 15th June, at Welwyn Garden City Station, on the main line of the Western Section, Southern Area, of the London and North Eastern Railway.

In this case, down express passenger, parcels, and mail train, No. 826, which left King's Cross at 10.58 p.m. for Leeds, overtook and came into violent collision with the rear of an express passenger train, No. 825A, which left King's Cross at 10.53 p.m. for Newcastle via Northallerton, West Hartlepool, and Sunderland. The latter train formed the second portion of No. 825, the 10.45 p.m. express which left King's Cross at that time for Newcastle direct via Northallerton.

I regret to report that 13 passengers (including three children and a Railway Servant) and guard J. McIntosh, of train No. 825A, lost their lives. In addition, 29 passengers were seriously injured and detained in hospital, while 52 others, who continued their journey, had to receive subsequent treatment for minor injuries and shock. There were some 280 passengers in train No. 825A, and 57 in train No. 826.

The collision occurred within a few yards of Welwyn Garden City box; the attached plan shows the site, the layout of the station, signalling, etc., and the approximate positions in which the trains came to rest. No. 825A had been incorrectly checked by signals when approaching the station, and was apparently travelling at about 15 m.p.h., while No. 826 is assumed to have struck it at not less than 65 m.p.h.

A taxi-driver immediately initiated emergency telephone calls; the Station-Master arrived within five minutes, the Welwyn Garden City ambulance within 10 minutes, doctors and nurses were soon on the scene, and the Royal Free Hospital, London, at once sent assistance by special train which arrived at 1.14 a.m.

I understand that 10 ambulance boxes and salvage apparatus were available at once from the two trains concerned, and from another train which had come from Luton. With regard to illumination, besides the station electric lighting and the lights which also remained burning in some of the carriages, 12 emergency oil lamps from the trains, and 20 station hand lamps were immediately available; permanent-way tunnel gangs also arrived by specials at 12.48 a.m. and 12.55 a.m., and made use of torches and acetylene flares.

The record showed that 14 doctors, as well as nurses, responded to the call, and evidently the numbers of First-Aid men, ambulances, stretchers, etc., were adequate, and the injured were speedily and efficiently attended to in difficult circumstances.

The Welwyn Garden City and Hatfield Fire Brigades were summoned, but fortunately their services were not required, and, with the Police, they were able to render useful assistance in other directions. Two small fires were observed in the wreckage of the five gas-lighted coaches in the middle of train No. 826 (probably the sixth and eighth coaches); but apparently neither fire was connected with the presence of gas. One was due to splinters set alight by cinders, and the other to oily waste from a broken axle box; the Station-Master stamped out one fire, and the other was put out by a chemical extinguisher which was available from the signal box.

Train No. 825A was hauled by 2-cylinder engine No. 4441, Atlantic type (4-4-2), with a 6-wheeled tender weighing, in working order 112 tons 14 cwt., and comprised 11 bogie coaches, weighing unloaded 350 tons 12 cwt. The engine and tender were fitted with the vacuum brake working blocks on all wheels of the train except the engine bogie, brake power being 331·73 tons, viz., 68·39 per cent. of the weight of the loaded train, which is assumed to have been 485 tons. The total length of the train was 732 feet.

Train No. 826 also consisted of 11 bogie vehicles, weighing 271 tons 8 cwt. unloaded, and was drawn by 3-cylinder engine No. 4009, K3 type (2-6-0), with a

6-wheeled tender. The engine and tender weighed in working order 123 tons 4 cwt., and were fitted with the vacuum brake operating blocks on all wheels of the train except the leading pair on the engine. Brake power was 268·12 tons, viz., 63·8 per cent. of the total weight of the train, some 420 tons including load. The total length was 661 feet.

It was a dark night, and there was some drizzle; but according to the evidence visibility was 500 to 600 yards.

Effects of the Collision, Damage, etc.

The marshalling of the two trains concerned, particulars of the rolling stock (all 8-wheeled bogie vehicles), and damage, are given in Appendix I.

The line was blocked till 4.30 p.m. on Sunday, 16th June, and in the meantime traffic was diverted via Cuffley; the scheduled service was maintained and only a few trains were cancelled. Material damage to the permanent way of the down main extended over about 100 yards, involving 111 new sleepers, 390 chairs, 9 crossing timbers, 6 rails, etc.

The majority of the 11 coaches of the leading train, No. 825A, were of modern construction. All had Buckeye couplers, Pullman vestibules, and electric lighting, and, with the exception of one, heavy steel underframes.

The last vehicle, No. 141 (58 feet 6 inches long, having three third-class compartments with the brake compartment in rear), bore the brunt of the impact. The underframe, unbroken but crushed into a small space, was found embracing the front end of the engine of train No. 826, the body having been completely shattered; the roof came to rest in the position shown on the attached plan. The underframe was thus carried forward, with its bogies, for a distance of about 140 yards; the three compartments of this coach were all occupied, and no one could have survived in it. The bodies of the passengers were found in the wreckage along the line, between the signal box and the overbridge under which engine No. 4009 came to rest; guard McIntosh's body was in this length on the left of the down main line. While a number of injured passengers were also in this area, the majority of serious injuries apparently occurred in the third coach of train No. 826.

The last but one coach, No. 1014, Third Class, went on for a further 100 yards with the rest of train No. 825A. The impact caused this coach to lose both its bogies—which were pushed forward with the debris in front of engine No. 4009—and it almost fell over. The remarkable thing was that the leading Buckeye coupler held firm and remained the sole support of the leading end, in the absence of the bogie; it was not until this coupler was cut by the oxy-acetylene blow-pipe that the coach fell over. There were apparently some 30 people in it and no one was seriously injured. The rear end and vestibule, etc., were pushed in and the frame over the rear bogie was bent downwards, but there was no telescoping. Slight damage was also caused to the third and fourth vehicles from the rear of this train.

With regard to train No. 826, the violence of the shock was confirmed by the way in which the frames and buffer beam of its heavy engine were bent; fortunately it was not derailed, and this no doubt saved still worse damage to the stock of this train, which, unlike No. 825A, was not entirely composed of modern construction, and included five, out of 11, gas-lighted vehicles.

The first three coaches, Nos. 134, 42439 and 43175, withstood the shock well, as they were of heavy construction with steel underframes and wood bodies, Buckeye coupled. The two leading vehicles were not derailed; the first was only slightly damaged, and the second had not even a window cracked. The trailing wheels of the trailing bogie of the third left the road, the rear of this coach being partly telescoped as the result of the wrecking of the following three luggage vans, Nos. 4014, 498 and 492, all over 30 years old (each weighing 21 tons), and having wooden frames and bodies, gas lighting, and screw couplings.

The seventh vehicle, No. 43062, a First and Third Compo brake, was of more recent construction, and its steel frame came to rest (adjacent to the north end of the platform) on top of the six bogies of the three old vehicles which were ahead of it. The body of this vehicle was badly damaged and half telescoped by the following brake van, No. 408, which, being also screw coupled, was wrecked, though it was of modern construction with a steel frame.

The following brake van, No. 4013, was of 1902 construction, but it remained on the road and coupled (by screw) to the last two brake vans, which were connected by the Buckeye coupler and were undamaged.

Description.

From Potters Bar (at the top of the 13 mile rise from King's Cross) the gradient falls easily in the down direction, through Brookmans Park and Hatfield, to 18½ m.p.; thence it rises at 1 in 200 for nearly two miles to the site of the collision, this fact being of interest, in view of the evidence.

From Welwyn Garden City box (20 m. 683 yds. from King's Cross) the following are the approximate distances to relevant points :—

Hatfield No. 1 box	2 m.	1,481 yds.	South.
Hatfield No. 3 box	2 m.	1,013 ,,	,,
Hatfield No. 2 box	2 m.	946 ,,	,,
Hatfield down main starter	2 m.	645 ,,	,,
Welwyn Garden City down main and slow distants		1,795 ,,	,,
Overbridge No. 66 (3 arch)		1,646 ,,	,,
Overbridge No. 67 (3 arch)		1,024 ,,	,,
Welwyn Garden City down home signals		390 ,,	,,
Approximate point of collision		23 ,,	North.
Engine of train No. 826 where it came to a stand with the underframe and bogies of coach No. 141 in front of it		164 ,,	,,
Rear end of coach No. 1014 of train No. 825A ...		258 ,,	,,
Front of train No. 825A		483 ,,	,,
Welwyn Garden City down main advanced starter, with Welwyn North down main distant under it		847 ,,	,,
Welwyn North box	1 m.	972 ,,	,,

The view of the down main home signal light obtainable by drivers, taken from the right-hand side of the footplate, from an engine of the same class as No. 4009, on the night after the accident, was found to be approximately 600 yards.

At Hatfield, No. 1 box, at the South end, deals with all traffic; but, at the North end, No. 2 box deals with up traffic and the Hertford branch, while No. 3 box deals with down traffic and the Luton branch.

The layout of the lines between Hatfield and Welwyn Garden City is shown on the plan, there being a pair of down passenger roads and a pair of up passenger roads, with the Luton and Hertford single line branches on the West and East sides respectively. Between Welwyn Garden City and the viaduct at Welwyn North there is a down goods line adjacent to the down main line, and an up slow line adjacent to the up main; thence the line is double over the viaduct and through the Welwyn South and North tunnels.

A scale drawing is attached of the instrument shelf at Welwyn Garden City; it is located in the usual place above the mechanical frame of 45 working and 20 spare levers, which faces away from the main line. The single lines are operated by 3-indication needle block instruments, the indications being "*Line-Clear*," "*Train-entered-Section*," and "*Line-Blocked*." The instruments stand normally in the "*Line-Blocked*" position, and, Welwyn Garden City being a non-crossing station, the commutators for the sections on either side are interlocked.

The main lines are operated by combined up and down 3-position 3-wire needle type block instruments, with the same indications. Welwyn Garden City station and box were built some 10 years ago. There are track circuits 200 yards long in rear of the down main home and down slow outer home signals, which, when occupied, place and maintain the block instruments at Hatfield No. 3 to the "*Train-entered-Section*" position, if the signalman at Welwyn Garden City has not pegged his instrument to "*Train-entered-Section*"; in such circumstances a buzzer sounds in Welwyn Garden City box, and continues to do so until the signalman places his mechanical block instrument indicator to the "*Train-entered-Section*" position. The track circuits are also indicated on the illuminated diagram in the box. "*Line-Clear*" proves the down main home signal lever normal and the distant arm at caution. There is also sequential

locking between the down main home and the down main advanced starter, the latter being controlled by continuous track circuiting ahead of it to 440 yards beyond the Welwyn North down main outer home.

In all there are 11 block bells in Welwyn Garden City box, and it will be observed that the down main pegging instrument to Hatfield No. 3 is 3 feet 6¼ inches from the corresponding up main pegging instrument to Welwyn North. In the Hatfield direction, as there are separate up and down boxes there, separate bells are provided for the Up Slow, Up Main, Down Main and Down Slow, as well as for the two single lines. In the Welwyn North direction, the Up and Down Main lines have a common block bell, but the Down Goods and Up Slow lines have separate bells.

Hatfield No. 3 is an old box, built about 1896, situated on the West side of the line; the frame faces the line and has 68 working and 12 spare levers. Hatfield No. 2 is about the same age and contains 77 working and 8 spare levers. There is no sequential locking in either of these boxes, and signals are not released or proved by the block instruments.

The junction points at Welwyn North (Digswell Junction) for the Up Slow and Down Goods lines are power worked, and the box contains a new mechanical frame of 36 working and 4 spare levers. There is considerable track circuiting, and the equipment generally is of modern type. "*Line-Clear*" proves the arm and lever of the down home signal and the arm of the down distant signal.

Report and Evidence.

I. The 10.45 p.m. train, No. 825, travelling at its usual speed, at least 60 m.p.h., passed Welwyn Garden City at 11.20 p.m., this being the time recorded for the relevant block bell signals in Hatfield No. 3, Welwyn Garden City, and Welwyn North boxes, the three posts concerned in this case. The run of 7½ miles from Potters Bar, the top of the gradient had occupied about 10 minutes. The previous down train, No. 823, the 10.32 p.m. express from King's Cross, had passed Welwyn Garden City on the down main at 11.4 p.m.

II. The 10.53 p.m. train, No. 825A, was in charge of driver R. E. Morris and the late guard J. McIntosh. Morris said that the train was not checked until Welwyn Garden City was approached; after passing Hatfield at 65 to 70 m.p.h., he whistled at a point about 300 yards in rear of the distant signal when he observed it at caution. He reduced speed, and when about halfway between the distant and home signals, he observed the latter clear and whistled again; he released the brake, passed the home signal at about 20 m.p.h., and let the train "*roll until the starting signal came into view.*" He observed this signal in the clear position from the London end of the station, whistled a third time, a short pop, applied steam again, and, according to his estimate, was travelling as fast as 25 m.p.h. and was within 100 yards of the advanced starter when the collision occurred.

Reference, however, to the plan and foregoing statement of distances, shows that, as the train was 244 yards long, Morris must have been as much as 580 yards from the advanced starting signal when the collision took place, and, contrary to his statement, the signal cannot be seen until the country end of the station is reached. Fireman G. Glenn confirmed this fact, though he generally supported the rest of Morris' evidence, including his estimate of speed and the suggestion that the engine was only within a hundred yards of the starting signal when the collision happened.

On the other hand, Mr. G. W. Turner, District Foreman, Carriage and Wagon Department, Peterborough, who was travelling in the fourth coach from the rear of the train, said that while it did not actually come to a stand when approaching the home signal, he was in conversation with the passenger opposite him as to whether the station being passed was Hitchin or Welwyn Garden City. Mr. Turner looked out to ascertain by observing the name board, and judged that speed "*was a little more than* 10 *m.p.h.*" He heard no whistling.

There were also seven firemen from the North Eastern Area who were travelling home on this train as passengers, and they made reports of their experiences; their consensus of opinion was that speed at the time of the collision was 15 to 20 m.p.h.

III. The 10.58 p.m. train, No. 826, was in charge of driver Charles Barnes, whose age is 60 years and service 41 years. He has a good record, and had been

driving for 23 years, and knew the road and this train well. It had no scheduled time, but was programmed to follow No. 825A as soon as possible, and, unless conditions were exceptional, it was expected to pass Hatfield, 17¾ miles from King's Cross, in 31 minutes, and thence to stop at Hitchin (32 miles from King's Cross) in 18 minntes.

Barnes had worked the same train on the 13th and 14th June with an Atlantic type engine (15,649 lbs. tractive effort), but on the 15th the train was lighter and was being hauled by the more powerful K.3 class engine of 30,031 lbs. tractive effort. In fact, on the 15th, the former type of engine was hauling train No. 825A weighing 372 tons, while train No. 826, with the heavier engine, weighed only 297 tons. Barnes was therefore probably travelling up the gradient to Potters Bar a little faster than Morris, and was actually checked by signals at Wood Green (five miles from King's Cross). Barnes said that the brake then appeared to act satisfactorily; thereafter he was not checked, and he judged that he passed Hatfield at normal speed, 60 to 65 m.p.h. He had reached there in 26 to 27 minutes, viz., four to five minutes under the usual timing. He was not trying to make up time and apparently did not think he was doing so; his fireman, F. L. Jones, suggested that speed might have been 70 m.p.h. when passing Hatfield.

The Welwyn Garden City down distant signal was clear, and it appears that this speed was maintained until Barnes observed (from a point about halfway between Bridge No. 67 and the home signal, that is to say, at a distance of some 300 yards) that the home signal was showing a red light, when he immediately closed the regulator and fully applied the brake. He thought he did this *before* passing the signal, and he saw the tail lamp of train No. 825A at the same time. Indeed, he suggested at first that he applied the brake some 600 yards from the point of collision, and he was quite sure that it had taken effect and that speed was considerably reduced before the collision took place. He had realised in a few seconds that an accident was inevitable; he therefore held on, and he said that after the first shock the train came to a stand gradually and no secondary shock was felt. Barnes said that the tail lamp was showing a good light, but that he had no time to reverse, nor to apply sand.

Under cross-examination, however, it became clear that Barnes was indefinite as to how far he really was from the home signal when he applied the brake, but he was confident that he passed the signal at danger, as Jones had also shouted. Jones confirmed Barnes' evidence; he had fired after observing that the distant signal was clear, and on looking up and seeing (through the cab window) that the home was at danger, he shouted "*On.*" His impression was that Barnes applied the brake 50 yards before reaching the home signal, viz., about 460 yards from the assumed point of collision; he said he felt the brakes act, that speed was then 70 m.p.h., and that he saw the tail lamp *after* passing the home signal. He added that No. 4009 was the best K3 class he had fired on, and that his firing experience covered 15½ years.

The foregoing evidence of the enginemen was contradicted by the three experienced passenger guards, W. H. Wisbey, G. P. Mountstephen, and G. Gale, who were riding in the first, fifth and tenth vans respectively.

Wisbey, who knew the road and working very well, is 56 years of age and has been a passenger guard at King's Cross for about 30 years. He said that on this occasion he experienced no difference from the usual running of the train; he realised that it had been checked at Wood Green, and he felt the brake application. But he felt no application at Welwyn Garden City prior to the collision, which he judged took place at the speed at which Hatfield was passed, 60 m.p.h. in his opinion. He was sitting at the side of the van preparing his journal; he was thrown on to the floor and his lamp went out. He got up, lighted the lamp, and noted the time as 11.28 p.m. As the van was next the engine, he would have expected the automatic valve to come into operation, had a full brake application been made, but this did not happen.

Mountstephen, a man of 46, with 25 years' service as a passenger guard at King's Cross, also knew the road and working well. He thought that the train was running no faster than usual, and that at the time of the collision it was passing Welwyn Garden City at normal speed, about 60 m.p.h. He neither heard nor felt the brake being applied, and the automatic valve did not come into operation. He was sitting in the guard's seat on the near side; he had looked

out at Hatfield but his view was obstructed by rain. The next thing that happened was a violent jerk which caused his head to come into contact with the partition. The van (fifth) then rolled violently, and, as already stated, being of old construction and screw coupled, it was wrecked, and tilted over the up main at an angle of about 45 degrees. Mountstephen was thrown out on to the permanent way, close to the box, and had a very fortunate escape. He went up to the box at once and told signalman F. Howes to put all signals to danger; he asked him for a hand lamp and for an explanation of what had happened, but received no reply.

Gale (tenth van) likewise knew this train very well, and is a man of 55, with 28 years' service as a passenger guard at King's Cross. He also had noticed the check at Wood Green, and was standing up sorting letters and parcels traffic when the collision took place; he was thrown violently, first one way and then the other, and came into contact with the brake partition. Like Wisbey and Mountstephen, he did not hear or feel the brake being applied, and he estimated that speed at the time was the same at which the train usually passed Hatfield and Welwyn Garden City, viz., 55 to 60 m.p.h.

IV. Signalman A. Crowe, of Hatfield No. 3 box, is 54 years of age; he joined the service in 1896, has been a signalman for 34 years, and has acted in this capacity at Hatfield since 1918. His account gives the necessary information with regard to the times relating to the bell signals for the three trains concerned. Each passed him under clear signals, travelling, he thought, at the usual speed of 60 to 65 m.p.h., and his evidence was as follows :—

" At 11.11 p.m. I was offered the ' Is Line Clear ' signal by Hatfield No. 1 for the first part (No. 825) of the 10.45 p.m. express ex King's Cross and I accepted it at ' Line Clear.' At the same time I offered the train to Welwyn Garden City and this also was accepted at ' Line Clear.' I received ' Train-entering-Section ' signal at 11.17 p.m. The train passed my box at about the same time, and I sent ' Train-entering-Section ' signal forward at 11.17 p.m. and received ' Out-of-Section ' from Welwyn Garden City at 11.20 p.m. At 11.17 p.m. I was offered the ' Is Line Clear ' signal by Hatfield No. 1 for the second part (No. 825A) of the 10.45 p.m. express ex King's Cross and I accepted it at ' Line Clear ' at the same time. I offered the train forward to Welwyn Garden City at 11.20 p.m. and this signal was accepted. I received ' Train-entering-Section ' at 11.21 p.m. The train passed me at about the same time and I sent ' Train-entering-Section ' signal to Welwyn Garden City at 11.21 p.m. and ' Train-out-of-Section ' signal was sent to Hatfield No. 1 at the same time. I received ' Train-out-of-Section ' signal for this train from Welwyn Garden City at 11.23 p.m. At 11.21 p.m. I was offered the ' Is Line Clear ' signal from Hatfield No. 1 for (No. 826) the 10.50 p.m. express passenger, parcels and mail train and accepted it. I offered the train to Welwyn Garden City at 11.23 p.m. and this was accepted. I received ' Train-entering-Section ' signal at 11.25 p.m. The train passed me immediately afterwards and I sent ' Train-entering-Section ' signal forward to Welwyn Garden City and ' Train-out-of-Section ' signal to Hatfield No. 1 at 11.25 p.m. At 11.29 p.m. I received the ' Obstruction Danger ' signal (six bells) from Welwyn Garden City.

From the time I took duty at 10 p.m. until 11.23 p.m. I had no telephonic conversation with signalman Howes of Welwyn Garden City. At 11.23 p.m., however, when I received the ' Train-out-of-Section ' signal for the second part of the 10.45 p.m. express ex King's Cross and I also received ' Line Clear ' for the 10.50 p.m. express passenger, parcels and mail train, I rang up signalman Howes of Welwyn Garden City and said to him, ' Is that out ? ' (meaning Out-of-Section for the second part of the 10.45 p.m. express ex King's Cross). Howes replied ' Yes ' and I said ' Right.' At 11.29 p.m., as previously stated, I received the ' Obstruction Danger ' signal from Welwyn Garden City. I called up signalman Howes and asked him what was the matter and he said, ' 826 has run into the rear of 825.' I said ' Why, you gave me out for him at 11.23,' and he made no answer; I distinctly heard the receiver put up on the telephone hook."

The important time is 11.23 p.m., when Crowe received the *Out-of-Section* signal from signalman F. Howes (for, he presumed, train No. 825A), and when he immediately offered him, and received acceptance for, train No. 826. Crowe stated that he invariably booked all signals at once, and, as he only dealt with down trains, he was never so pressed as to allow his booking to become delayed.

He had found Howes entirely satisfactory to work with, and they very rarely spoke on the telephone; he had met Howes twice, and referred to him as a "*quiet man who gets on with his work.*"

With regard to the telephone conversation following Howes' acceptance of train No. 826, Crowe explained as follows:—

"*When I received 'Out-of-Section' at* 11.23 *p.m., it occurred to me that it was rather smart, being only about two minutes. The train had not been checked in any way and it was travelling at normal speed, viz.,* 60 *to* 65 *m.p.h. Although two minutes is nothing unusual, e.g., train No.* 823 (*which preceded No.* 825) *was only two minutes between the 'Entering-Section' and 'Out-of-Section' signals,* 825A *was a much heavier train, and, as the preceding train* (*No.* 825) *was only a short distance in front, I thought probably that it* (*No.* 825A) *would get a distant check at Welwyn Garden City, and for that reason I was more or less surprised that it was only two minutes. I therefore called up the signalman at Welwyn Garden City on the telephone and said, 'Is that out, Fred?' and he replied, 'Yes,' and I had then no hesitation and pulled off my signals for No.* 826. *I had already had the train accepted before I initiated this telephone call . . .*

It would have been contrary to the usual practice to initiate a telephone call in regard to 825A *in between the receipt of the 'Out-of-Section' signal and the acceptance of the following train, No.* 826 (*which followed immediately*). *My initiation of this telephone call was a very rare occurrence. Perhaps it does not happen once a year. I was not at all suspicious and I had no hesitation whatever. What doubt existed at the time was entirely dispelled at once by signalman Howes' reply. It did not occur to me to mention the number of the train specifically, as I went straight from the bell to the telephone, and there was no lapse of time, so my inquiry was obviously about the preceding train, and as there was no hesitation in Howes' reply, I did not hesitate to pull off.*

With regard to queries relating to the 'Out-of-Section' signal, I do not remember ever asking the man in advance to confirm an 'Out-of-Section' signal with regard to an express, though possibly I have done so for a goods or empties train, which may have been a long time in section owing to being short of steam, etc.

I have no hesitation in saying that I received acceptance from Welwyn Garden City for No. 826, *and I know from my experience I could not have made a mistake. I am quite satisfied that the train did not run through my signals but that he had a clear road and was not checked at all.*"

This was the first occasion on which Crowe had asked Howes any question by telephone with regard to block working, and he agreed that more precise phraseology would have been desirable. With regard to his second conversation, which took place immediately after the receipt of the "*Obstruction Danger*" signal, he was quite certain that Howes had said that No. 826 had run into No. 825, and he stated that Howes' "*reference to the number of trains after the accident was what was to be expected and I understood.*"

V. Signalman H. Broughton, of Hatfield No. 2 up box, is 52 years of age, with 31 years' service, since 1910 as a signalman and since August, 1933, at his present post. He had met signalman Howes once, namely, on the 11th May when Howes took over Welwyn Garden City.

No. 830 and No. 736 up passenger and goods trains had passed Welwyn Garden City at 11.3 and 11.6 p.m. respectively, and Broughton had transmitted the *Out-of-Section* signal for the latter at 11.16 p.m., at which time Howes offered him the following up goods train, No. 787. Broughton at first refused the latter, but accepted it two minutes later at 11.18 p.m., and that train passed Welwyn Garden City at 11.23 p.m., as entered in Howes' register, while Broughton received the *Entering-Section* signal for it at that time. In these respects the records of the last named train in the two boxes correspond exactly, and it passed Hatfield at 11.32 p.m.

VI. Signalman H. Ball, of Welwyn North, is 32 years of age; he has acted in his present capacity since May, 1922, and has been at Welwyn North since December, 1934. His account was as follows:—

"*At* 11.18 *p.m. I was offered the 'Is Line Clear' signal for the first part of the* 10.45 *p.m. express from King's Cross* (*No.* 825), *and I accepted it at 'Line Clear.' I offered the train forward to Woolmer Green at the same time and it*

was accepted. I received 'Train-entering-Section' signal for this train at 11.20 *p.m., and it passed my box at* 11.22 *p.m. I sent 'Out-of-Section' signal to Welwyn Garden City at the same time, and 'Train-entering-Section' to Woolmer Green. I received 'Out-of-Section' signal for this train from Woolmer Green at* 11.23 *p.m.*

At 11.22 *p.m. I was offered the 'Is Line Clear' signal from Welwyn Garden City for the second part of the* 10.45 *p.m. express from King's Cross (No.* 825A), *and I accepted it at the same time. I offered the train forward to Woolmer Green at* 11.23 *p.m., and it was duly accepted. I received 'Train-entering-Section' signal for the train from Welwyn Garden City at* 11.27 *p.m. At* 11.29 *p.m. I received the 'Obstruction Danger' signal, six bells, for the up main line. At* 12 *midnight I received the 'Obstruction Danger' signal on the up slow line."*

With regard to the up goods train, No. 787, Ball said that he received the *Out-of-Section* signal for it at 11.27 p.m., viz., at the same time as he received the *Entering-Section* signal for down train No. 825A, presumably a few seconds before the accident. But he could not remember which of these signals was received first; they were both received "*at about the same time.*" He had not had occasion to speak to Howes, and he noticed nothing wrong with his block working; "*in fact, things seemed to be working normally.*" He received the *Obstruction-Danger* signal at 11.29 p.m., and immediately after that Howes called him up and said, "*The News has run into the second portion of* 825 . . . *Oh, it's terrible!*" His turns of duty had synchronised with those of Howes, whose working he had always found entirely satisfactory.

VII. Signalman F. Howes, of Welwyn Garden City, is 43 years of age, and was posted to this box on the 11th May last, after five weeks' training since the 8th April. He has been in the Company's service since June, 1908, as a Lad Learner, Telephone Lad, Porter, Signal Learner, and finally Signalman since July, 1912, at Navenby (9 years), Kirton (11 years), Ranskill (1 year), Doncaster (2 years). He had no War service.

In accordance with custom, a vacancy, which had occurred at Welwyn Garden City, had been advertised, and Howes, who was fourth in seniority of five applicants, was selected for training; of the three others above him, the first withdrew his application, the second preferred to remain in the Company's house which he was occupying, and the third was only a Class 4 signalman, and, although he had longer service than Howes, it was considered undesirable to transfer him to a Class 1 box. Howes commenced his training on the 8th April, his hours of duty, eight daily, being left to him, and he said he changed about with each of the signalmen; he had been on the night shift, 10 p.m. to 6 a.m., for probably a week. An extract from his statement on the subject is as follows:—

"*I had no difficulty in learning, but the traffic in this district was quite strange to me after what I had been used to (at Doncaster A, which is a permissive box, except for express trains on the up main), and that is why I took five weeks to learn.*"

Mr. V. M. Barrington-Ward, Superintendent, Western Section (Southern Area), said that Howes' "*record is perfectly satisfactory and quite good reports have been received from Doncaster in regard to his work.*" District Inspectors A. Shores and A. Chamberlain, of Doncaster, also spoke very well of him. For instance, the former visited Doncaster A box on several occasions when Howes was on duty and had opportunities of watching his work; he stated that "*during the time Howes was at A box I had no reason to think that he was in any way unfitted for the responsible position which he held.*" Inspector Chamberlain examined Howes in connection with his appointment at Ranskill and had "*no hesitation in certifying that he was a fit and proper person for the position.*" He also examined him on the 4th February, 1933, in connection with the appointment at Doncaster, when "*he satisfied me he was competent to do the work required of him.*" Chamberlain saw him in the box on several occasions, when he carried out his duties satisfactorily, and examined him again on the 25th April, 1934, with the result that "*I was once more able to certify him as competent. During the time Howes was under my notice he did not give cause for any complaint with regard to unsatisfactory signalling so far as I know; and he always struck me as being a very careful signalman and one to consider everything well before making a move.*"

Signalman F. C. Birch, who is 44 years of age, with service in his present capacity since 1911, had been stationed at Welwyn Garden City since the box was opened in 1926. He was a good witness, and said that Howes trained under him for part of his time. "*As a signalman he seemed to understand the duties fairly well. The work in this district seemed different to him from the work he had been doing, but he appeared to be grasping it quite all right. His training had been spread over about five weeks, but I cannot say exactly how long he was with me. I say 'fairly well' because, unless a man has got thoroughly used to a box, I would not say he had thoroughly mastered all the duties and details. You could not compare his with my knowledge, as I had opened the box and I know every detail connected with the box and also with the traffic; but I consider he was entirely fitted to take over the duties. I tested his knowledge of the Block Regulations and he knew them very well; for instance, I asked him if there was any question he wanted to ask me, and he said he would be pleased if I would prompt him in readiness for Inspector Hook. I consider he was quite suited to act as a signalman . . . When Howes came to Welwyn Garden City he knew nothing about track circuiting, but I taught him all I knew about it.*"

As to character, Birch said that "*Howes was not very talkative, and that he would remain very quiet and probably go for an hour without speaking. I was in eontact with him almost daily for about 10 weeks and did not know whether he was a member of the Union or not.*"

Inspector H. W. Hook, to whom signalman Birch referred, is one of the eight Signal Inspectors in this District, and is in supervisory charge of 57 signalmen. He is 47 years of age and has 23 years' service, having risen from porter, signalman, relief signalman, and traffic controller to his present position, in which he has acted for 7½ years. He stated that during Howes' training he used to call in the box "*sometimes once and sometimes twice a week when I was at the station, and I explained to him the differences in the working between Doncaster A box and the working at Welwyn Garden City. I worked Doncaster A box myself and I was thoroughly acquainted with the working. I told Howes not to hurry over learning the duties but to get the job well off before he sent for me to examine him. . . .*

I made one examination on the 11th May, and I was quite satisfied with Howes. The examination consisted of the following:—I went into the box on the morning of the examination and I was there 1½ hours whilst he worked the box himself. I examined him on the frame and then took him outside and showed him where the points were and all the signals, etc. I then examined him on Double Line Block Rules and Regulations, Single Line Working, and Speeial Working, and I was quite satisfied he was competent to take charge. I did not know Howes before coming to Welwyn Garden City, but I knew him to have been on the main line as he was in the signal box at Ranskill for nine months. I was quite satisfied that he was capable of working Welwyn Garden City box. I think he is an average type of man and I should not have let him take charge if he had not been entirely suitable in my opinion. He appeared to be steady, rather slow and quiet, and as far as I know of good temper. . . .

Signalman Howes is the first signalman in my experience to have taken five weeks to learn a signal box, at any rate in this part of the country, although at Doncaster they may have been longer learning. I have never refused to pass a signalman for a box, but I have had occasions to see them two or three times before passing them. As signalman Howes was, before the accident, I consider he had the temperament for a signalman. The examination through which I put signalman Howes on 11th May occupied from 10.10 a.m. to 12.15 p.m., after which both Howes and I signed the certificate. I then required him to take duty from 7.30 p.m. to 10 p.m. that night, in order to liberate a Relief signalman who was working in the box and who was required elsewhere. It was on my authority that Howes took over the duties of the box.

The selection of applicants for signalmen's positions is made by the District Superintendent and not by the District Inspector. It was left to signalman Howes to say when he would be ready for examination. . . . Howes answered my questions quite satisfactorily, but he did not strike me as one of the brightest men. I had to drag everything out of him as he was not at all forthcoming. I would have preferred a man I had in my own District . . . but it was a case of seniority, and it was not for me to say who should get the job. I am only there to test his capabilities. If anything, my examination of Howes was stiffer than usual.

I do not think the senior men should always have the jobs, and in my opinion it should go by merit rather than seniority. I think the system of seniority is prejudicial to getting the best men in the boxes. I think the Railway Companies should have the right to choose whom they think best. I think, going amongst signalmen generally as I do, I should know their capabilities. I do not say it should be left entirely to me or any District Inspector, but to the District Superintendent, by whom, of course, the selection would have to be made. . . .

I had every confidence that signalman Howes would carry on the job satisfactorily, and I felt that he was going to turn out a first-class signalman. . . .

I would say that no one out of another District should go to work a first-class box in another District unless he had had previous experience of signal box working in that District. I would not say that a man who could not learn a box in three weeks should not be allowed to continue learning, although it may take five weeks before he is competent.

It is a recognised thing that a man learning the duties takes each of the turns in order to cover the 24 hours. I do not consider that the method of selecting signalmen would be improved by the man being interviewed by the District Superintendent."

Mr. Warriner, the District Superintendent, King's Cross, stated that he did not meet signalman Howes until the 4th June, on which date he interviewed him with regard to a matter of discipline which is referred to later. Mr. Warriner explained that Howes came to the district with a good character and that he had been a signalman for many years; in view of his history, and having been passed as competent by the District Inspector, Mr. Warriner did not consider it was necessary for him to see Howes prior to Howes taking charge.

Mr. A. G. Rickett, late Signalling Superintendent, Superintendent's Office, Western Division, Liverpool Street, who kindly attended my Inquiry, at the suggestion of the Company's officers and at my request, said he had known Howes for some years as a signalman at Kirton and Doncaster A boxes, but he did not remember him at Ranskill. Mr. Rickett expressed his opinion of Howes' capabilities and suitability as follows :—

" I did not think he was a very brilliant signalman, and I think the same today. I would not say he does not know his Rules and Regulations, but at the time I knew him at Kirton from 1922 to 1926 I would not have expected him to have taken over a Class I box, but since the new method of dealing with promotion, men have got to higher positions than one would expect."

On the other hand, it should be stated in Howes' favour that, when he was learning at the Retford Signalling School, he was reported on favourably by Mr. Rickett in May and July, 1909, viz., that *" he understood the Block Rules and telegraph,"* and that he was *" a smart good lad "* and *" should make a reliable signalman."*

VIII. On the 18th May, a week after Howes took charge, I understand that, in connection with the operation of an up express passenger train, he infringed Rule 39A and lowered the outer home signal too quickly, with the result that the train overran the inner home at danger; thereafter, it was alleged that he agreed with the driver concerned not to say anything about the occurrence, and Station Master Hodson discussed the matter with him five minutes later. Subsequently a report was called for, but Howes refused to submit one on the ground that he did not think it was necessary after the explanation which he had already given.

As a matter of discipline, therefore, Howes was interviewed at King's Cross on the 4th June by Mr. F. Warriner, who told him *" after a good deal of discussion, and as kindly as I could, what my proposal was with regard to dealing with this particular case. . . . I also informed him I should have to report it to the Superintendent for confirmation and he would be hearing further."* Subsequently, on the 13th June, Mr. Warriner issued the confirmatory decision, with the Superintendent's authority, that Howes should be *" severely reprimanded,"* the intimation being added that the usual appeal could be made in writing within seven days (copy attached as Appendix II). Mr. Hodson received this on the 15th June, and, in accordance with practice, left it in the box ready for signalman Howes when he came on duty at 10 p.m.

In this connection, paragraph 25 of the confidential brochure with regard to the Company's procedure for dealing with discipline cases reads as follows :—

" *When the receipt of an advice connected with a discipline case may affect a man's efficiency during his shift of duty, arrangements should be made for the advice to be handed to him at the end, and not at the commencement or during the course, of his shift. This ruling applies particularly in the case of signalmen.*" I understand, however, that this ruling was not considered to apply to the decision in question, which, as stated, was merely confirmatory of what had transpired at the interview of the 4th June; for this reason, therefore, Mr. Hodson did not receive instructions to deal with the advice in any other than the usual way.

Signalman Birch stated that Howes arrived in the box " *before I was due off, and we were together for about seven minutes before he took over. There was a letter for Howes waiting for him when he took duty; he read it out to me and the remark I made was, 'Don't worry about that, they cannot hang you for it.' He did not discuss the contents of the letter with me. He did not appear to be upset when he got the letter. I should imagine it is difficult to see when Howes is upset, as he is of a quiet, retiring disposition.*"

Howes said he was in good health at the time, and made the following statements with regard to his feelings on receiving this letter :—" *When I came on duty I received a caution notice in regard to a disciplinary irregularity. This was a surprise to me, but it did not affect me very much for more than a few minutes, although I may have thought about it several times since I received it. . . I was hurt to think I had to receive the form. Though I had had the interview on 4th June, I did not know the form was coming and it came as a surprise to me. It was a surprise because I thought the case was finished when I went to London, but the form conveyed to me exactly what was said to me by Mr. Warriner, District Superintendent, at the interview.*"

IX. With regard to the operation of the three down trains concerned, Howes' evidence was as follows :—

" *I knew No.* 825 *was running in two portions as we had a circular to that effect and signalman Birch reminded me of this. I was offered* 825 *at* 11.11 *p.m. and I received the 'Train-entering-Section' signal at* 11.17 *p.m.; I then offered it forward and got it accepted. The train passed Welwyn Garden City at* 11.20 *p.m. when I gave 'Train-entering-Section' signal forward, and 'Train-out-of-Section' signal to the rear, and I placed my signals to danger as the train passed them. I received 'Train-out-of-Section' from Welwyn North at* 11.22 *p.m. I received the 'Attention' bell and four beats with regard to* 825A *at* 11.20 *p.m. and I accepted the train; I received 'Train-entering-Section' signal for it at* 11.22 *p.m. at which time I offered it forward to Welwyn North and got it aeeepted, but I did not pull off immediately for the train as there was a telephone call from the station and I answered it at* 11.22 *p.m. To the best of my knowledge it was the Porter's voice; he asked me if I had asked Hatfield about a parcel that was left in the Hertford train, and I informed him that I had not been able to get the Inspector's office at Hatfield. This was the second telephone message I had had in regard to this parcel, the first telephone message having been some time previous, but I cannot remember the time, probably* 10 *minutes, this message also having been from the same man. I did not think this telephone conversation was taking me very long, and during the time I was replying I had another telephone call on the other circuit, namely, Hatfield and Knebworth circuit; that was from the signalman at Hatfield No.* 3, *and he asked me if I had given 'Out.' I replied 'Yes' (I understood signalman Crowe's reference to 'Out-of-Section' signal to be to* 825 *and that is why I replied 'Yes'). I thereupon immediately went and pulled my signals off for* 825A. *Perhaps a few seconds after I had pulled off he struck the track circuit in the rear of my home signal and the train was passing. When the train struck the track I placed the distant signal at danger, and when he had passed over the track and it had returned to 'Clear' I placed the home to danger, and as I was watching the train passing me I heard a crash just against the box. I did not know that the following train was approaching and I did not actually see the collision. I was looking out at* 825A *passing the box to see his tail lamp as he passed me, and as near as I can say the speed was about* 25 *miles per hour. I am afraid I am not a very good judge of speed. As the train was passing me I did not send 'Train-entering-Section' signal because I was at the window looking for the tail lamp,*

nor did I transmit the 'Out-of-Section' signal. When the accident occurred I immediately sent the six bells 'Obstruction Danger' signal in both directions.

I had the conversation with signalman Crowe of Hatfield No. 3 box. I have met Crowe and this was some weeks ago. I got on all right with him and have found him quite satisfactory. I do not know the name of the signalman at Welwyn North, but I know his Christian name is Horace, and I have been working quite satisfactorily with him.

With regard to the Up road, about this time I do not think there were any trains. I remember the Up Stock train on the Luton line which passed me at 11.25 p.m., about the time of the accident. If my memory does not fail me, this train passed me just before the crash. There was also another Up train on the Up Main, No. 787, which passed me at 11.23 p.m.; this would pass two minutes before the Luton train, but I cannot remember it going by. I know from my register that it was refused, but I cannot remember it. I make it a point of making up my book immediately after making my signals, as soon as possible.

The 'Train-out-of-Section' signal for 825A is not recorded in my book because I did not transmit the signal. I transmitted the 'Out-of-Section' signal for 825 and my conversation with signalman Crowe referred to that signal. The alteration made in my Block Book with regard to 'Entering-Section' signal 11.22 was made when I entered the acceptance of the train at 11.23 p.m. I put in 3 in the first place because in the position where I was standing I took it for 3 on the clock, but when I got against the back straight with the clock I realised it was nearer 22 than 23.

I remember No. 787 Up passing me but I cannot say at what speed it was travelling. I cannot explain the fact that I recorded 11.23 p.m. as the 'Out-of-Section' signal for the Up train No. 787 and the fact that the Welwyn North signalman records this as 11.27 p.m. I feel sure I should book it after I had transmitted the signal. I do not think I would have transmitted the 'Out-of-Section' signal at 11.23 p.m. to Hatfield instead of to Welwyn North. I have never found myself doing such a thing. I made no record with regard to the Parcels train and I do not remember that it was offered to me, nor have I any knowledge of any signal with regard to this train.

The only way I can account for the accident is that I did not know anything about 826. I have never heard of a signalman giving 'Out-of-Section' on the wrong bell and I do not think I have ever done it myself. I went to the book and booked the signals as I got them and at this time I was able to as I was not overpressed with work."

Howes said he did not think that the time which elapsed between his acceptance of train No. 825A (at 11.20 p.m.) and his conversation with signalman Crowe was more than one minute. He heard no whistling; the windows of his box were closed, the usual practice, *" in order to hear the bells and instruments. . . . . I have no idea how 826 got into the section, as I know nothing whatever about it. I am quite sure I did not overlook 825A and I knew all about this train but nothing about 826. . . .*

There are 11 block bells in my box and I have at times not been quite certain which bell was ringing, and I have usually waited for the second bell. I did no booking at Doncaster and found it rather difficult on taking over at Welwyn Garden City. I have never found the telephone messages too much, as I let them wait, neither do they interfere with the signalling part of the job. I answered the telephone before the bell for 825A; I expect I happened to be nearer the telephone than the block instrument I did not realise 825A was a long time in the section. . . .

When the collision occurred it was a complete surprise to me; I was looking out of the window at the time for the tail lamp of 825A. I had put the home signal back when the track was cleared. . . .

There are several telephone bells in my box, but I do not think they would interfere with my signalling. The work at Welwyn Garden City is heavier than I have been used to, but not a great deal heavier than at Doncaster. I did not feel that I wanted any assistance, but I found a little difficulty in the booking. . . .

I have no knowledge whatever of having taken No. 826. I do not suggest that signalman Crowe is making a mistake, but if I did accept it, I have no recollection of doing so. . . . The conclusion I have come to is that I knew nothing whatever of 826, *neither do I think that I belled on the wrong instrument; I think I should have noticed the difference in the tone of the bells.*"

X. The circumstances of the two telephone conversations to which Howes referred were explained by leading porter A. Jakes whose room and telephone are on the down platform. On the first occasion, he rang up Howes soon after the departure (11.3 p.m.) of an up passenger train, and, on the second occasion, at about 11.15 p.m., when he left duty. He judged the latter time by the fact that he had to walk across the bridge and get his bicycle, and that when passing through the booking hall he noted that the time was 11.20 p.m. I understand that the clock there is kept a little fast.

The first conversation was to ask Howes "*to ask the Hatfield Inspector if they had a parcel of lost property for Welwyn Garden City, and, if they had not got it out of the Hertford train, would they send someone down to the yard at Hatfield to see if it was still in the train.*" The second conversation was to ascertain whether Howes had heard anything; he had not, and promised to let Jakes know as soon as he had been able to communicate with the Hatfield Inspector. It was therefore arranged that Howes should ring up porter Perry who was remaining on duty till 1.30 a.m.

Inspector A. Lee, of Hatfield, stated that he had no conversation with Howes that evening, and that he must have been out of his office when Howes rang him up.

Conclusion.

XI. This following collision resulted from the improper entry into the Hatfield-Welwyn Garden City section of down train No. 826 when the section was still occupied by the preceding train, No. 825A. This was brought about by a lapse of the most serious nature on the part of signalman F. Howes of Welwyn Garden City; but the details of what actually happened must remain uncertain.

The crucial time was 11.23 p.m., when, according to his evidence, signalman A. Crowe, of Hatfield No. 3 box, received the *Out-of-Section* signal from Howes, for, he presumed, train No. 825A, and when he immediately offered Howes, and received his acceptance for, train No. 826. I do not think there is any doubt that the exchange of these two bell signals took place.

Although Howes pleaded entire ignorance of train No. 826, and, by inference, persisted in suggesting that Crowe had permitted this train to enter the section without authority, the telephone conversation with regard to the former bell signal admittedly took place, and Crowe would not have initiated the verbal inquiry had he not received the bell signal and been uncertain for the moment as to its reliability. There was thus subsequent verbal confirmation of the bell communication, and Crowe is therefore free from responsibility so far as his block operation is concerned; clearly Howes' reply set his mind at rest before he lowered his signals and permitted train No. 826 to enter the section.

On the other hand, the fact that this breakdown in block working occurred indicates that there was misunderstanding between the two men, arising from Crowe's brief question and Howes' briefer answer. I cannot believe that the accident would have happened had the purport of Crowe's uncertainty immediately penetrated Howes' mind and had it caused him to realise (assuming he was prepared to admit his mistake) that he had wrongly transmitted the *Out-of-Section* signal for No. 825A without having seen the train.

While the use of the telephone in connection with block operation is to be deprecated, this means of rapid communication is necessary for a contingency such as this. But the form of the question and answer should be precise and quite definite, leaving no loophole for wrong assumption, and I cannot but express regret, as Crowe himself did, that such an experienced and entirely reliable signalman, as he is, was deceived by the assurance which he received from Howes.

XII. It seems fairly certain that, at the moment of collision, train No. 825A was moving at a speed of roughly 15 m.p.h., steam having only just been applied when the advanced starter came into view.

The evidence of the staff with regard to train No. 826 is unfortunately conflicting. It is evident that the distant signal was clear and was passed at high speed; but the enginemen suggest that thereafter they observed and passed the

home signal at danger, and that from about that location they observed the tail light of train No. 825A when at a distance of at least ¼-mile (15 seconds) from the point of collision. Their account is that the brake was then immediately applied, but that they had no time to reverse or drop sand.

On the other hand, the three guards, riding in different parts of the train, all good and reliable witnesses and men of long experience, emphatically stated that they felt no brake application, though such had been noticed a short time previously when approaching Wood Green; all three also judged that speed at the time of the collision was normal. It is also noteworthy that the brakes should have been exceptionally responsive, as eight of the 11 vehicles were vans, each fitted with automatic valves, which should have come into immediate operation in the event of a full brake application.

In connection with this evidence, Mr. Gresley, the Chief Mechanical Engineer, also referred to certain tests which had been carried out after the recent accident at Loughborough, when a train of eight coaches, travelling at 66 m.p.h., was reduced in speed to 48 m.p.h. by full brake application after travelling 450 yards, and was stopped in 760 yards; the line was partly on the level and partly on falling gradients of 1 in 360 to 1 in 300. It will be noted that the gradient approaching Welwyn Garden City is 1 in 200 rising, and train No. 826 comprised 11 coaches.

Having regard, therefore, to the results of the collision, to the estimated speed (referred to above) of train No. 825A, and to the facts that, although its brake would have been immediately applied when the collision took place, it continued forward subsequent to the impact for 216 yards, while train No. 826 continued forward for 141 yards, I think that, at the moment of impact, the latter train cannot have been travelling at much less than 65 m.p.h. I cannot but conclude, therefore, that the enginemen, as the result no doubt of shock, were definitely mistaken in their evidence with regard to their view of the home signal and their estimate of where the brake was applied.

Barnes was travelling under a clear distant signal, probably at over, rather than under, 70 m.p.h., and it may be that Howes did not, in fact, replace the home signal before the engine passed it. Indeed, it seems most unlikely that the signal went to danger until Barnes was just upon it, and I much doubt whether he braked his train before he realised the situation on observing the tail light, merely a few seconds before impact.

XIII. The clocks at the three boxes concerned appeared, for all practical purposes, to be synchronised. The significance of the time referred to above, 11.23 p.m., lies in the fact that it was then that the up goods train, No. 787, passed Welwyn Garden City, as recorded there by Howes and at Hatfield No. 2 by signalman Broughton. Further, and more significant still, it was also the time recorded by Howes for the transmission to Welwyn North of the *Out-of-Section* signal for this train, although signalman H. Ball of that box did not record the receipt of that signal till as late as 11.27 p.m., when, at the same time, according to his evidence, he received, and recorded, the *Entering-Section* signal for train No. 825A; I presume that Howes transmitted the latter a few moments before the accident happened, though Howes himself did not record the signal and denied having sent it. Howes could also offer no explanation with regard to the receipt by Ball of the *Out-of-Section* signal at 11.27 p.m. In this connection I accept Ball's evidence; he appeared to be a reliable man with a good record.

It is quite clear that train No. 825 was dealt with properly; it passed Welwyn Garden City at 11.20 p.m. The next train to pass was No. 787 on the up road, at 11.23 p.m., by which time train No. 825A had been in the section, approaching Welwyn Garden City on the down road, for two minutes.

The belling and block indicator work up to that time appears to have been correctly carried out. Howes had accepted train No. 825A at 11.20 p.m., and the train entered the section at 11.21 p.m.; Howes' record shows the acceptance of the latter signal at 11.23 p.m., but it was altered to 11.22 p.m., and his explanation in that respect appeared to be reasonable, though the time is a minute behind the Hatfield record. He also received Ball's acceptance for the train at 11.22 p.m., and both registers tally in that respect; but there is his admittance that, thereafter, he was late in lowering his signals for the train.

Howes alleged that the second telephone conversation with porter Jakes intervened at this time, but the latter's evidence, which I have no reason to doubt, indicates that this conversation took place a little earlier (possibly even before train No. 825 passed). Howes' account was also to the effect that his conversation with Crowe interrupted that with Jakes, but this is, of course, still less probable, because at 11.23 p.m. he cannot have been speaking at a telephone instrument to Crowe when he transmitted the *Out-of-Section* signal and accepted No. 826, viz., before Crowe initiated the conversation.

In fact, it must have been at about this time, 11.22 p.m. to 11.23 p.m., that Howes' lapse occurred, his lowering of the signals for train No. 825A having been delayed till after his conversation with Crowe, and therefore after his erroneous transmission of the *Out-of-Section* signal and acceptance of train No. 826.

In view of the evidence, and of the records of the bell signals described above with regard to the passage of the up train at 11.23 p.m., the Company's officers were of the opinion that Howes transmitted this *Out-of-Section* signal at 11.23 p.m. to signalman Crowe, instead of to signalman Ball, viz., for down train No. 825A which had not reached him, instead of for up train No. 787 which had passed him.

They suggest that when train No. 825A was about to pass, and just before the collision, he transmitted (contrary to his evidence) the *Entering-Section* signal for it at 11.27 p.m., as recorded at Welwyn North, and that he noticed on the adjoining instrument that he had not transmitted the *Out-of-Section* signal for train No. 787; it is assumed that he would then have done so, in order to clear the instrument as soon as he noticed it; hence the booking at Welwyn North.

In brief the result was that Howes lowered his signals *twice* for the *three* down trains which were running block to block. On the first occasion, he did this in the usual manner after he obtained acceptance for train No. 825; but on the second occasion, the signals were not lowered until after he had erroneously accepted train No. 826, on the assumption that he was still dealing with No. 825A, for which he had already obtained acceptance ahead.

Howes did not think he operated the wrong instrument in this manner; but Inspector Hook and Mr. Rickett said they had had previous personal experience of such a mistake. For such an explanation to be acceptable, it must, of course, be assumed that when the up train, No. 787, passed, Howes unpegged the down main needle, transmitted the 2-1 bell signal to Hatfield, and received the acknowledgment from Hatfield on a bell (as shown on the attached drawing) situated 2 feet 8¼ inches from the bell of the corresponding Welwyn North instrument, which is of different tone. Further, he was thereupon offered and wrongly accepted a train (No. 826) on this same instrument, under the impression that he was accepting a following up train; hence perhaps his suggestion that he was aware of the existence of train No. 825A, but not of No. 826.

XIV. On the other hand, I find it difficult to avoid the opinion that Howes' breakdown was due to what might certainly be expected to have been the more likely cause, viz. forgetfulness, and inability to cope with temporary pressure involving quick sequence of bell signals and semaphore operation. Further, his state of mind at the time, as the result of the receipt of the discipline notice and of the telephoning of messages with regard to the missing parcel, cannot be overlooked; it is true that he did not urge the former, but he referred to the latter as specifically having a bearing upon his failure.

He had dealt with 11 up and 10 down trains in 85 minutes since he had been on duty, a number considerably above the average for the shift, and after the passage of train No. 825, the sequence of events appears to have become too much for him. It may be that when he was busiest, he was interrupted by the conversation with Jakes.

If, for instance (contrary to his evidence, which cannot be relied upon), his failure to lower the signals for train No. 825A was because it entirely went out of his mind, Howes may have glanced at his down line block instrument, and, seeing that it showed *Train-entered-Section*, assumed that he had omitted to transmit the *Out-of-Section* signal for the previous train, No. 825, whereas, in fact, he had correctly done so at 11.20 p.m. and had equally correctly operated the instrument again in accordance with his subsequent acceptance at that time of No. 825A, and in accordance with the entry of the train into the section at 11.21 p.m. or 11.22 p.m.

If this was his mistaken assumption, and if, in consequence, he unpegged the instrument which he intended to unpeg, he was able (because the home and distant signals had remained at danger) to accept, and did in fact accept, train No. 826 at 11.23 p.m., under the impression that it was train No. 825A. On receiving the *Entering-Section* signal at 11.25 p.m., and after noting that the instrument to Welwyn North showed *Line Clear* (in reality on account of the previous acceptance of No. 825A at 11.22 p.m.), he lowered his signals. Train No. 825A had by that time been in the section for at least three minutes, as the result of its heavy check; and No. 826, arriving in sight of the distant signal at about 11.26½ p.m., found it clear, not having (by then) been replaced behind No. 825A.

XV. Obviously the sequence of events, so far as the acceptance of train No. 826 and the lowering of the signals were concerned, must have been the same whether Howes erroneously unpegged the down instrument for the up train, No. 787, or whether he "*forgot*" train No. 825A. In either case, there was serious failure of the human element, and, as I have said, the Company's officers conclude that the former—a genuine mistake of which Howes was not aware—was the more likely cause. Against the latter theory there is the argument that Howes would normally have asked for *Line-Clear* from Welwyn North on the receipt of the *Entering-Section* signal for No. 826 from Hatfield at 11.25 p.m., and one would have expected him to have noticed that his instrument was already showing *Line-Clear* (for No. 825A); but by that time he had undoubtedly lost grasp of the situation, and his only explanation was that he could remember nothing about train No. 826.

While he said that in the whole of his experience, since 1912, he had never transmitted the *Out-of-Section* bell signal in the wrong direction, he admitted that he "*found a little difficulty in the booking*" at Welwyn Garden City when he took up the work, and that the maximum period which elapsed between operating his block instruments and entering up his register "*might possibly have been three minutes*". At times also he had "*not been quite certain which bell was ringing, and I have usually waited for the second bell*".

I have questioned him on three occasions in connection with this accident, the last being on the 9th August, by which date it was felt that he had fully recovered from the shock. Mr. Hodson, the Station Master, referred to him as a "*quiet, almost peculiarly quiet, man, and it is difficult to get anything out of him*". Signalman Birch emphasised the same characteristic, and Inspector Hook said he had to "*drag everything out of him, as he was not at all forthcoming*". He is obviously a man of quite unusual temperament, of very reserved demeanour, and with marked hesitancy of expression. I doubt also whether he has the power and habit of rapid thought, so essential in such a responsible position on a high-speed main line with comparatively short sections on either side. In addition, there is the operation of two single lines, one of which (Luton) carries considerable traffic.

XVI. The number of trains per hour throughout the day averaged 12·2 in 1934, and varied from 12 in April to 13 in August, there being 106 and 107 during the two day shifts and 81 during the night shift. The fact has already been mentioned that Howes had dealt with 21 trains in 85 minutes, viz., 15 per hour; on the 14th June, between 5.10 p.m. and 6.27 p.m., signalman Birch also handled 27 trains, viz., 21 per hour. The box contains 45 working levers; the illustration of the instrument shelf, with its 11 block bells, is attached. There are also five telegraph instruments, and in addition to the telephone used for traffic control purposes, there is a telephone and switchboard, to which three omnibus circuits (with respectively 7, 15, and 7 instruments on them) are connected, having five trembler bells—one in each circuit, one on the instrument, and one for the ring-off signal.

When the marks were last taken in December, 1934, (317·5 per hour), the number of telephone and telegraph written and verbal messages dealt with daily, other than those for operation and control purposes amounted to 10 and 9 respectively; there were also nine switching operations in conuection with extraneous conversations. When I watched the working of the box on the morning of the 31st July, I formed the impression that these figures may not fully represent the amount of such work, at any rate at busy periods, or when circumstances are exceptional.

In these circumstances, it follows that the matter of the selection and fitness of Howes for promotion to this post arises. I have therefore included in the foregoing evidence the opinions of the Inspectors who were in touch with him at Ranskill and Doncaster; also the evidence in full of Inspector Hook, who was responsible for passing him as competent, and for authorising his appointment on the day of his examination, the 11th May.

I understand that his promotion had not been unusually rapid; it had been carried out in accordance with the system of selection by seniority among those applying for such appointments. He commenced duty as a signalman in July, 1912, at Navenby, between Grantham and Lincoln, and left there in October, 1921, for Kirton. He was transferred from Kirton to Ranskill in April, 1932, on promotion from Class 4 to Class 3, and again to Doncaster A in February, 1933, on promotion from Class 3 to Class 2. He entered the Class 1 grade on the 11th May when he took charge at Welwyn Garden City. The rise in pay on each of these promotions was 5s. per week.

Ranskill box is on the main line near Retford, and operates high-speed traffic in both directions; it has 33 working levers, and Howes took 17 days to learn the duties. At Doncaster, he took 23 days; this box has 23 working levers and operates up traffic only, partly under Permissive Regulations; it is a busy box. He explained that he took as long as five weeks to learn the duties at Welwyn Garden City, owing to the strangeness to him of the traffic in the district; but this very fact, in my opinion, seems to indicate that possibly he may have been below average, though I was assured that this period was not unusual in the experience of the Company's officers for a box of this character, and particularly for a man not used to the district. It will be noted also that signalman Birch considered that, though Howes had grasped the work satisfactorily and was fit to act as a signalman at Welwyn Garden City, he knew nothing about track circuiting when he arrived.

But I do not wish these criticisms to be misunderstood. Inspectors Shores and Chamberlain, who examined and supervised Howes' work, for three years, while he was at Ranskill and Doncaster, spoke well of him, the former (who supervised between 500 and 600 signalmen) referring to him as up to average; further, Inspector Hook himself said that he had "*every confidence*" that Howes "*would carry on the job satisfactorily*".

On the other hand, Hook, unlike the other Inspectors, had previous experience as a signalman, and would have preferred another man for the vacancy which Howes filled; also Mr. Rickett expressed the opinion that in 1926 he would not have expected Howes to have taken over a Class 1 box. Hook, therefore, certainly took the right course in allowing Howes as long tuition as he required; but I think the facts show that in the end he was really deceived as to Howes' suitability for the post.

Moreover, Hook has never refused to pass a signalman, and in the circumstances I feel that he would have been wise, in this instance, to have obtained a confirmatory opinion, as the result of interview, by referring the appointment to Mr. Warriner, his District Superintendent. Indeed, it transpired that, as Howes came from Doncaster, Mr. Warriner only met him for the first time when Howes got into trouble after he had been in the district for six weeks.

The incident of the 18th May, a week after he took over, commenced with a minor irregularity, but it finally involved a serious question of discipline, as the result of Howes' readiness to hush up the matter with the driver concerned, and his refusal to make the subsequent report which was called for. Indeed, I understand that at the interview at King's Cross on the 4th June, Mr. Warriner had to warn Howes that a more serious view, even than the administration of a severe reprimand, might be taken of the matter when the Superintendent came to deal with it.

It is true that the Superintendent's decision merely confirmed what transpired at the interview, and that Howes did not complain that the notice did more than come as a surprise to him; indeed, it may be that its receipt relieved him from apprehension of a more serious penalty, such as removal from the box. But I doubt whether it can be seriously urged that the receipt of the notice, as he came on duty, was unlikely to affect his efficiency, and the incident which gave rise to it was also significant of an undisciplined mind, which might prove unequal to maintaining the standard expected of main line signalmen.

In all the circumstances, therefore, I find it difficult to satisfy myself that

XVII.—(1) This regrettable disaster was caused by breakdown of Absolute Block Working, train No. 826 having been permitted to enter the Hatfield-Welwyn Garden City section while the section was still occupied by the preceding train, No. 825A. This was brought about by a serious lapse on the part of signalman F. Howes, of Welwyn Garden City.

Either he inadvertently transmitted the *Out-of-Section* bell signal and cleared the *down* block instrument for an *up* train which was passing at the time, or he operated the instrument with intention and accepted the following train, No. 826, having overlooked train No. 825A. The effect of either mistake was the same, and, as at King's Langley, nothing but continuous track circuiting will assuredly safeguard such a violation of the first principles of block working.

(2) I have no reason to doubt that the enginemen of train No. 826 were on the alert, and, therefore, I do not think that they can be criticised; they were fortunate to escape as they did, and it was still more fortunate that the engine was not derailed. I agree with the Chief Mechanical Engineer in thinking that, having regard to the results of the collision, the relative speed of the two trains was "*something between* 50 *and* 55 *m.p.h.*," viz., No. 825A was under steam accelerating at about 15 m.p.h., while No. 826, with the brake fully applied, overtook it at a speed of not less than 65 m.p.h.

In the rare event of such error on the part of the signalman, the second line of defence depends upon the vigilance of the driver and the efficiency of the tail light protecting the obstruction; the latter point has received considerable attention lately. I think the decision, taken in the case of this Company as long ago as 1924, to dispense with the additional two side lights on passenger trains is to be regretted from the point of view that, in an emergency, such as occurred on this occasion, the *pattern* of three red lights is more easily recognisable than a single one, and thus provides a far more conspicuous and arresting danger signal to a driver, who may be approaching at high speed and is unaware of the obstruction.

(3) In this case, as train No. 825A had not reached the track circuit (200 yards long) in rear of the home signal when the *second* acceptance (for train No. 826) was given, apparently the accident would have been prevented had the controls on the block instrument by this track circuit been such that, once *Line-Clear* has been transmitted, it could not have been transmitted a second time until the track circuit had been occupied and cleared. This should be combined with the Company's normal equipment (which was not installed), by which the starting signal at Hatfield also would be released once only by each block acceptance.

I recommend that consideration be given to this suggestion, with a view to the application of the additional control in suitable places, such as Welwyn Garden City, where such track circuits exist and where releases (which are objectionable) are not likely to be needed except to deal with emergencies. Modernisation of equipment at Hatfield also appears to be desirable, in view of the heavy and high-speed nature of the traffic; but, as already stated, the absence of the Company's usual controls there had no bearing upon the accident. It is also desirable to record the fact that direct means (at the distant signal) of intermittent Automatic Train Control would not have had preventive effect.

(4) I have examined the arrangement of the block instrument shelf; the distance, centre to centre, between the instruments concerned is 3 ft. $6\frac{1}{4}$ ins., and they are satisfactorily situated with regard to the levers below them. The circumstances of this accident illustrate the desirability of giving general consideration to the best position, designation, and possibly to the colouring, of block instruments, in order to differentiate between them as much as possible; the only specific suggestion which I can make is that the difference in tone of block bells should be accentuated, or that indicator shutters should be fitted, a comparatively simple matter, to show which bell has sounded.

(5) As at King's Langley, this failure in block working was not safeguarded, as I think it might have been, by precise phraseology in the subsequent telephonic conversation between the signalmen concerned. While the use of this means of communication in connection with block working is permissible only in exceptional circumstances, I recommend definite prohibition, unless the conversation is formally phrased, is duly recorded in the registers of each of the signalmen concerned, and is therefore open to supervision.

I suggest that the attention of the Railway Companies be drawn to this matter; it is noteworthy that in their standard Block Telegraph Regulations, one Company insists upon reference to the full description of the train in circumstances such as those under consideration, and another Company prescribes formal conversation in connection with Regulation 11, which deals with the action to be taken when a train is an unusually long time in the section.

(6) Besides the block bells, of which there are 11, and of which the tone is difficult to differentiate, frequent code signals on four of the five bells of the telephone circuits and on the five single needle telegraph instruments have to be interpreted by the signalman. There is no doubt that shortly before his breakdown Howes was interrupted by the telephone conversation with the porter about a matter—a passenger's missing parcel—which was entirely unconnected with his line of thought relative to train sequence. The porter was using Howes not merely as a telephone exchange operator, but as a transmitter of his inquiries; I understand that such procedure and the telephone switching arrangements are not uncommon.

In these circumstances, consideration appears to be necessary with regard to the provision of a telephone and booking lad to assist the signalman, and such assistance is provided here during holiday and rush periods. While this may not be justified on the night shift, which was the period concerned, I suggest that the signalman should be relieved of the distraction caused by the use of the telephone, except for operating purposes, by locating a switchboard in the booking office, by which local calls on traffic matters should be connected to a through circuit, without his intervention. I realise that this matter concerns the grading and pay of signalmen; but where the Company has decided not to provide a telephone and booking lad, the removal, so far as is practicable, of all extraneous telephone operation from important signal boxes appears to be highly desirable.

(7) It was not alleged, as was the case at Stoke Works Junction in 1924, that the disciplinary notice, which was received by signalman Howes when he came on duty, had any effect on his efficiency, and, of course, it would not have been handed to him had the District Superintendent thought that any risk would have resulted. It is also true, I understand, that there was no departure from recognised practice, and the Company's officers did not consider that paragraph 25 of their confidential instructions was contravened, the notice having been of a confirmatory character, and not in the nature of a first intimation of the punishment awarded. On principle, however, I recommend that in future all such notices—which state the charge and the punishment, and intimate the right of appeal—should be delivered to signalmen at the end of their turn of duty, particularly when serious misdemeanour is concerned, as on this occasion.

(8) Apart from the foregoing remarks with regard to procedure, equipment, etc., Howes' failure, in my opinion, proved that, though he had a good previous record, he was not really fit to shoulder the work (including the distractions) and responsibility attaching to Welwyn Garden City box. With regard to the selection by seniority for appointments of main line signalmen, strict regard is paid to the general suitability of applicants; but in this respect, however satisfactory a man's reports may be, it seems essential that the responsible officer, that is to say the District Superintendent, or his Assistant, should satisfy himself by personal contact before training is commenced, and certainly before the appointment is made. I understand that the Company propose to adopt procedure on these lines in future.

(9) The maintenance of the high standard of efficiency, which signalmen are expected to attain, is of great importance, having regard to the increasing intricacy of equipment, pressure of traffic, introduction of power working, and reduction in the number of boxes. The signalling school at Retford was closed about 1926, I presume on grounds of economy; it was for the training of porters and others as signalmen, and of lads in telegraphy, etc. While the Company has a complete system of education (including signalling) for their clerical staff, I feel that the introduction of well-organised classes of lectures and/or correspondence courses for the wages grades would have a mind-broadening effect and be beneficial in facilitating the technical education of signalmen, while affording means for intercourse and exchange of ideas between officers and staff.

(25) With regard to the behaviour of the rolling stock in this serious collision, the outstanding feature was the service rendered by the Buckeye coupler, as a safeguard against telescoping, in its application, with Pullman vestibules, to heavy steel underframes. The results indicated that this coupler, with its rubber buffering, was instrumental in preventing a heavier casualty list in the rear coaches of train No. 825A and in the leading coaches of No. 826. The last vehicle, No. 141, of the former train bore the main shock, and it would obviously be impracticable to provide any type of coach to resist forces of the magnitude which must have been involved. Further, the suitability and security of this coupler were illustrated by the fact that the intermediate vehicles of train No. 826, which were not so fitted, became separated and wrecked, and were responsible for the partial telescoping of the third coach of this train.

Since 1896 all new corridor stock, both for the Great Northern and East Coast services, has been fitted with Buckeye couplers and Pullman vestibules; steel underframes were not adopted for such stock until 1905. There still remains, however, a proportion of corridor stock, built prior to 1923 by the other constituent Companies of the Group, which was not fitted with this coupler, and some of it also is not provided with electric lighting. The Chief Mechanical Engineer informed me that an increased programme of construction is now being undertaken, and I strongly recommend acceleration in this respect; it affords the principal means by which fuller use of both features (the Buckeye conpler and electric lighting) can be attained. Re-equipment of this nature has also the advantage that expenditure thereon is related to mobile and revenue earning assets, while, at the same time, it affords immediate benefit to various industries.

I have the honour to be,
Sir,
Your obedient Servant,
A. H. L. MOUNT,
Lieut.-Colonel.

The Secretary,
Ministry of Transport.

APPENDIX I.

Formation of Train No. 825A; all 8-wheeled bogie vehicles, Buckeye coupled, electrically lighted:—

No.	*Class and Particulars.*	*Damage.*
4441	Atlantic type 2-cylinder engine with a 6-wheeled tender. Weight 112 tons 14 cwt.	Nil.
123	Brake van. Built 1914. Steel frame, wood body. Weight 25 tons 15 cwt. Emergency tools and appliances.	Nil.
41809	Composite Brake. Built 1906. Steel frame, wood body. Weight 30 tons 4 cwt. Emergency tools and appliances.	Nil.
42364	Third class. Built 1906. Steel frame, wood body. Weight 29 tons 8 cwt.	Nil.
4223	Composite Brake. Built 1915. Steel frame, wood body. Weight 34 tons 4 cwt. Emergency tools and appliances.	Nil.
22942	Third class. Built 1931. Steel frame, wood body. Weight 33 tons 10 cwt.	Nil.
22208	Third class. Built 1928. Steel frame, wood body. Weight 33 tons 10 cwt.	Nil.

No.	*Class and Particulars.*	*Damage.*
1032	Third class. Built 1924. Steel frame, wood body. Weight 34 tons 5 cwt.	Nil.
1369	Third class. Built 1906. Wood frame, wood body. Weight 32 tons 10 cwt.	Vestibule door at south end damaged.
1017	Third class. Built 1924. Steel frame, wood body. Weight 34 tons 5 cwt.	Buckeye coupler at rear end twisted, frame bent and headstock damaged.
1014	Third class. Built 1924. Steel frame, wood body. Weight 34 tons 5 cwt.	Badly damaged at rear end and both bogies knocked off.
141	Third class brake. Built 1920. Steel frame, wood body. Weight 28 tons 16 cwt. Emergency tools and appliances.	Demolished.

Formation of Train No. 826, all 8-wheeled bogie vehicles:—

No.	*Class and Particulars.*	*Damage.*
4009	K3 type 3-cylinder engine, 2-6-0, with a 6-wheeled tender. Weight 123 tons 4 cwt.	Front buffer beam and smoke box door badly bent. Pony truck damaged. Piston valve guide broken. Union link broken. Front footplate badly damaged. Brake gear damaged. Left-hand spectacle (safety glass) broken.
134	Brake van. Built 1922. Steel frame, wood body. Buckeye couplers. Weight 26 tons 18 cwt. Electric lighting. Emergency tools and appliances.	Headstock at south end bent. Cell boxes, dynamo and brake gear damaged.
42439	Third class. Built 1906. Steel frame, wood body. Buckeye couplers. Weight 29 tons 7 cwt. Electric lighting.	Nil.
43175	Composite. Built 1910. Steel frame, wood body. Buckeye couplers. Weight 30 tons 12 cwt. Electric lighting.	Partially telescoped and very badly damaged; trailing wheels of the trailing bogie derailed.
4014	Brake van. Built 1902. Wood frame, wood body. Screw couplings. Weight 21 tons. Gas lighting. Emergency tools and appliances.	Wrecked.
498	Brake van. Built 1900. Wood frame, wood body. Screw couplings. Weight 21 tons. Gas lighting. Emergency tools and appliances.	Wrecked.

No.	Class and Particulars.	Damage.
492	Brake van. Built 1900. Wood frame, wood body. Screw couplings. Weight 21 tons. Gas lighting. Emergency tools and appliances.	Wrecked.
43062	Composite Brake. Built 1907. Steel frame, wood body. Screw couplings. Weight 28 tons 16 cwt. Electric lighting. Emergeney tools and applianees.	Very badly damaged and telescoped at rear; derailed.
408	Brake van. Built 1922. Steel frame, wood body. Screw couplings. Weight 22 tons 18 cwt. Gas lighting. Emergency tools and appliances.	Wrecked.
4013	Brake van. Built 1902. Wood frame, wood body. Screw couplings. Weight 21 tons. Gas lighting. Emergeney tools and appliances.	Frame buckled, buffer broken; not derailed.
432	Brake van. Built 1912. Steel frame, wood body. Buckeye couplers. Weight 23 tons 10 cwt. Electric lighting. Emergency tools and appliances.	Nil.
428	Brake van. Built 1909. Steel frame, wood body. Buckeye couplers. Weight 25 tons 6 cwt. Electric lighting. Emergency tools and appliances.	Nil.

APPENDIX II.

London and North Eastern Railway,
District Superintendent's Office,
King's Cross.
13th June, 1935.

To:—
Signalman F. Howes,
Welwyn Garden City.

With reference to the interview which you had with me on the 4th June, 1935, concerning your irregular working in connection with the 12.42 p.m. Express Passenger Train, Hitchin to King's Cross, on May 18th, 1935, and your failure to carry out your Station Master's instructions in connection with submitting a report respecting same.

It has been decided you should be severely reprimanded and the case recorded on your service history and warned if there is any further trouble both as regards block irregularities and refusing to obey the Station Master's instructions, the question of you being allowed to remain in your present position will be considered.

Any appeal which you may desire to make against this decision must be made by you personally in writing so as to reach me within seven days of this date. You may be accompanied at any interview which you may be granted by a spokesman who may either be another Employee, or a representative nominated by your Union.

(Sgd.) F. WARRINER,
District Superintendent.

(31429—54) Wt. 1634—418 650 9/35 P. St. G. 379/13

L.N.E.R. SOUTHERN AREA — WELWYN GARDEN CITY

COLLISION 15TH JUNE 1935.

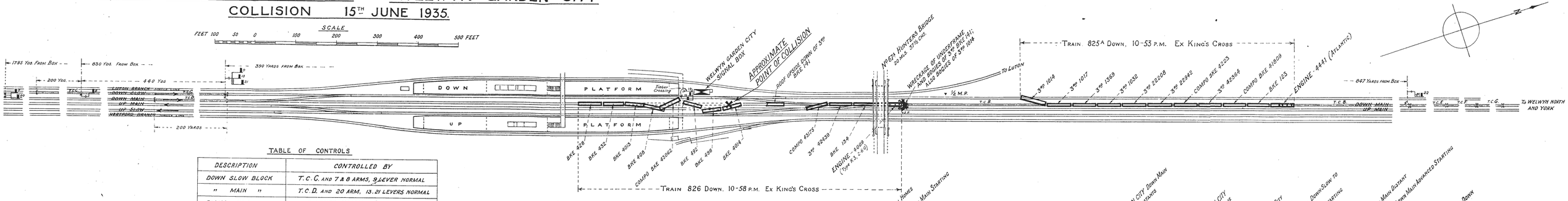
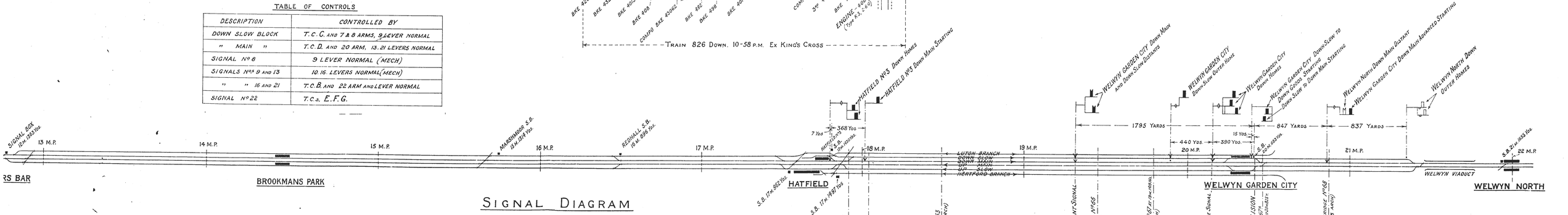
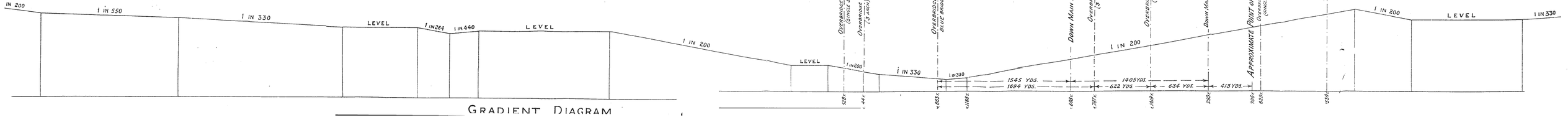


TABLE OF CONTROLS

DESCRIPTION	CONTROLLED BY
DOWN SLOW BLOCK	T.C.C. AND 7 & 8 ARMS, 9 LEVER NORMAL
" MAIN "	T.C.D. AND 20 ARM, 13.21 LEVERS NORMAL
SIGNAL No 8	9 LEVER NORMAL (MECH)
SIGNALS Nos 9 AND 13	10.16. LEVERS NORMAL(MECH)
" " 16 AND 21	T.C.B. AND 22 ARM AND LEVER NORMAL
SIGNAL No 22	T.C.B, E.F.G.



SIGNAL DIAGRAM



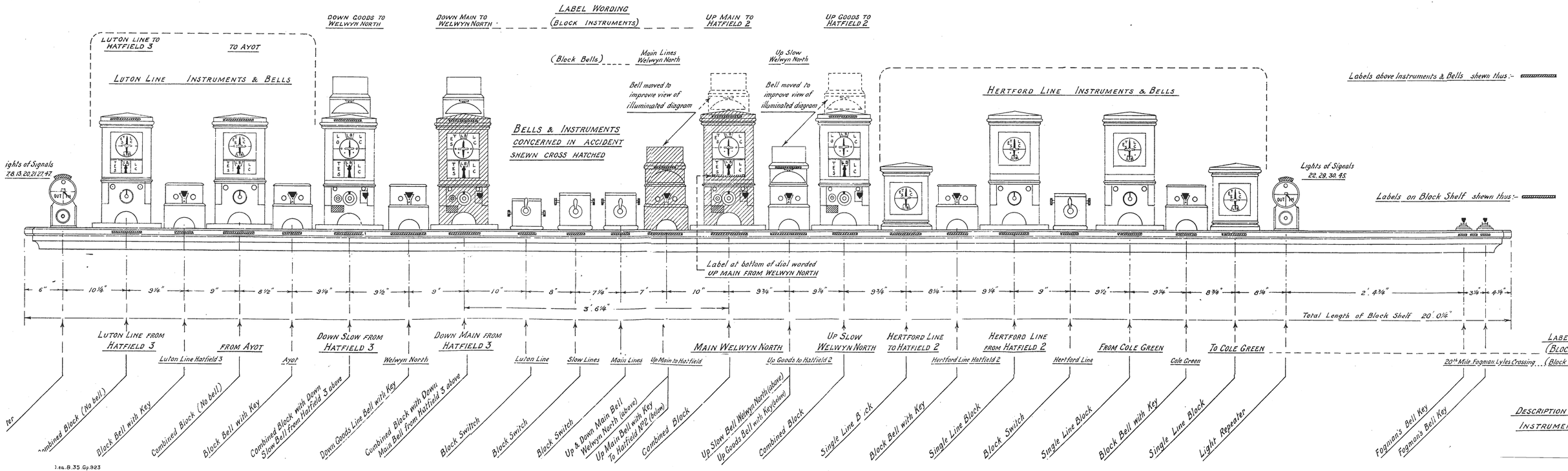
GRADIENT DIAGRAM

L.N.E.R. SOUTHERN AREA — WELWYN GARDEN CITY

DETAILS OF BLOCK SHELF

SCALE :- 1½ Inches to a Foot

Feet 1 — 0 — 1 — 2 — 3 Feet



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