

LONDON AND NORTH EASTERN RAILWAY.

Ministry of Transport,

7, Whitehall Gardens,

London, S.W. 1.

13th April, 1927.

SIR,

I have the honour to report, for the information of the Minister of Transport, in compliance with the Order of the 14th February, the result of my Inquiry into the causes of the collision between two passenger trains, which occurred on the 14th February, about 9.10 a.m., near West Parade signal-box, Hull, on the London and North Eastern Railway.

In this case, the 8.22 a.m. passenger train from Withernsea to Hull was approaching Paragon Station on "B" incoming line when it came into head-on collision with the 9.5 a.m. passenger train from Hull to Scarborough, which in some way had been diverted from "C" out-going line, and was travelling on "B" road in the facing direction. I much regret to report that serious loss of life resulted. Eight passengers were killed and four subsequently died in hospital from their injuries. In addition 24 passengers suffered serious injury and 22 minor injuries. The driver and fireman of both train engines were also injured. The fatalities and serious injuries were in the main due to the telescoping of a number of the coaches.

The Withernsea train was drawn by Class F engine No. 96 (type 4—4—0) with 6-wheeled tender, and included 9 passenger vehicles. The following were the weights and overall dimensions of the stock of this train:—

	Weight.	Length.	Con-	Under-	Lighting.
	Tons. cwt.	Ft. in.	structed.	framing.	
Engine No. 96 and tender	85 18	56 6	1891		
No. 2500 3rd Class bogie non-corridor coach ...	23 16	52 8	1904	All steel	Electric
No. 23336 do. do. ...	23 12	55 10	1904	Steel sole-bars	Gas
No. 2458 do. do. ...	23 16	52 8	1915	All steel	Electric
No. 3495 3rd Class six-wheeled saloon ...	14 13	37 10	1905	Wood	Gas
No. 2716 3rd Class bogie non-corridor van ...	20 15	55 10	1908	Steel sole-bars	Gas
No. 2954 3rd Class bogie non-corridor coach ...	23 12	55 10	1901	do.	Gas
No. 23092 Composite bogie lavatory coach ...	25 10	55 10	1903	do.	Gas
No. 22959 3rd Class bogie non-corridor van ...	20 15	55 10	1901	do.	Gas
No. 21841 do. do. ...	20 15	55 10	1896	do.	Gas
Total	283 2	534 8			

The Scarborough train was drawn by Class M engine No. 1628 (type 4—4—0) with 6-wheeled tender, and included 5 passenger vehicles, the weights and dimensions, etc., being as follows:—

	Weight.	Length.	Con-	Under-	Lighting.
	Tons. cwt.	Ft. in.	structed.	framing.	
Engine No. 1628 and tender	93 14	56 1½	1894		
No. 3363Y 3rd Class bogie non-corridor van ...	23 2	55 10	1904	Steel sole-bars	Gas
No. 3358Y Composite bogie lavatory coach ...	25 10	55 10	1904	do.	Gas
No. 22953 3rd Class bogie non-corridor coach ...	23 2	55 10	1901	do.	Gas
No. 3365Y 3rd Class bogie non-corridor van ...	23 2	55 10	1904	do.	Gas
No. 22292 3rd Class bogie non-corridor coach ...	27 10	54 8	1925	do.	Electric
Total	216 0	334 1½			

All the passenger stock was constructed with steel sole bars or steel under-frames except No. 3495, which had a timber frame. Both trains were fitted throughout with the Westinghouse air pressure continuous brake, working blocks on all wheels except those of the engine bogies, and the centre pair of wheels of the 6-wheeled saloon. The continuous brake could be operated by the driver from the engine footplate, or by the guard from any of the carriage vans.

After the accident the tender of engine No. 96 was found under the roof of the front half of the leading coach of the Withernsea train, the first five compartments being telescoped. The first five compartments of the second coach were also telescoped, and had penetrated the rear end of the front coach. Two compartments at

the rear end of the third coach had been crushed in by the leading end of the fourth coach; and the front half (van portion) of the fifth coach was telescoped and had penetrated the rear end of the fourth coach. The last four vehicles of the Withernsea train were on the rails and undamaged.

In the Scarborough train the front half (brake portion) of the first coach was telescoped against the rear of the tender of engine No. 1628, the roof of the coach extending over the tender as far as the footplate. Headstocks were broken in the second, third and fourth vehicles, whilst the last vehicle was undamaged.

It was fortunate that, although so many of the vehicles were fitted with gas lighting, no fire arose in the wreckage.

The weather was clear at the time of the accident and visibility good.

Details of damage to engines and carriage stock are given in Appendices I and II.

Description.

The lay-out of the platforms at Paragon Station, Hull, and of the lines westward (including gradients), is shown on the accompanying diagram. It will be seen that there are, for the greater part of the distance between the two highway bridges (Park Street and Argyle Street) which cross the railway, seven running roads shown in heavy lines and known from north to south as A, B, C, D, E, F and G respectively. The short portions of these lines used in both directions are shown in heavy dotted lines. Of these roads A, B, D and F are used by down or ingoing traffic, and C, E and G by up or outgoing traffic. The junction arrangements of the double lines from Hornsea and Withernsea (north-east), from York and Scarborough (north) and from Leeds and Doncaster (west), are also shown on the diagram, together with the position of Paragon Station, Park Street and West Parade Junction signal-boxes. The relative points and signals referred to in the report are numbered on the diagram.

Measured from the centre of Paragon Station signal-box, the approximate distances to the undermentioned points, signals, etc., are:—

Starting signals No. 1 platform	14 yards east.
Park Street Bridge over Railway	93 yards west.
Signal bridge carrying Nos. 170-172 outgoing signals	145 yards west.
Park Street signal-box	238 yards west.
No. 95 facing slip points on C road... ..	244 yards west.
No. 83 facing points on B road	301 yards west.
Rear buffers of Scarborough train after collision ...	536 yards west.
Point of collision	638 yards west.
Argyle Street bridge	710 yards west.
West Parade Junction signal-box	727 yards west.
Rear buffers of Withernsea train	873 yards west.

All points and signals controlled from Paragon Station and Park Street signal-boxes are operated electro-pneumatically. Air is compressed to 100 lbs. per square inch either by electric motor or gas engine, and the pressure reduced to 75 lbs. in the pipes leaving the power house. Electricity is stored in accumulators in three groups, one of which is under discharge, one fully charged for reserve, and the third in process of being charged. The electromotive force used is 16 volts.

Point, etc., motors consist of a main cylinder into which compressed air is permitted to enter, for the purpose of moving the main cylinder piston which reverses or restores the switches or signals to their normal position. The entry of the air on one or the other side of the main piston is controlled by a slide valve with suitable ports. This slide valve is itself moved in the slide valve cylinder by the admission of compressed air through pin valves, which are controlled by separate magnets. In the normal position of the switches one of these magnets (M. 1) is energised, and holds the pin valve open to air pressure and the exhaust from the slide valve closed. When a point lever is moved to reverse the points, the electric current is cut off from magnet 1 and sent to magnet 2. This allows the pin valve V. 1 to close and opens the exhaust on the same side of the slide valve. It also opens the pin valve V. 2 and closes the exhaust on the other (reversing) side of the

slide valve cylinder. The slide valve is thereby forced over a spring lock, and allows compressed air to enter the main cylinder through port 2, thereby driving the main piston forward and moving the points.

The installation at Hull was carried out and approved in 1905, and no alterations have been made, except in connection with providing greater accuracy in the detection of the position of the point switches.

Evidence.

1. The evidence in this case was taken partly on the 17th February and partly on the 20th March, the interval being caused by the fact that certain of the witnesses had not recovered sufficiently from their injuries, and by the necessity for carrying out certain electrical tests on a Sunday.

2. Signalmen Taylor and Hawkyard were on duty at West Parade signal-box, the former being in charge. Times for acceptance, passing of trains, etc., are not recorded in this box. Taylor stated in evidence that the Withernsea train was offered to him from Botanic Gardens, the block post westward of West Parade, about 9.5 a.m. The train was due at Paragon Station, Hull, at 8.56 a.m., and was therefore about ten minutes late. He immediately offered the train to Park Street signal-box on line B, and received acceptance. At the same time he received from Park Street the "Is line clear" bell signal for the Scarborough train on line C, and accepted it. He recalled that there was no interval of time between his acceptance of the Scarborough train and the receipt of the train entering section bell signal for that train from Park Street. He sent the train entering section signal for the Withernsea train when the train had left Botanic Gardens, where it was not booked to stop. It was almost the invariable practice to signal the Scarborough train out of the Station on C up road, and there was nothing abnormal that morning in connection with the signalling of either of the trains. Signalman Hawkyard pulled off signals Nos. 25, 15, 6 and 2 for the Withernsea train, and Taylor himself pulled Nos. 100, 101 (outer home) and 102 (distant signal) for the Scarborough train. The view of trains approaching West Parade signal-box from Hull is much restricted, and insufficient to enable a signalman to tell upon which line a train is actually approaching. The first that Taylor knew of the collision was the sound made by the engines meeting, and, looking out of the window, he could see the carriages breaking up, though he could not actually see the engines. He did not know at the time what the Withernsea train had collided with. At the moment, the signals were lowered for a Leeds and Doncaster train to approach Hull on D line, and also for the 9.5 a.m. London express from Hull on E line. He immediately put all his signals to danger. Taylor thought that the Withernsea train was travelling at its normal speed of about 15 miles an hour when it passed his post.

Signalman Hawkyard confirmed signalman Taylor's evidence, but thought the normal speed for trains coming from the West was about 20 miles an hour when they were passing West Parade signal-box. He said that a train approaching his post on C road did not come into sight until it was within 200 yards of Argyle Street bridge. He only learnt that the Withernsea train had run into the Scarborough train when the fireman of the latter came to the signal box, after the collision, to ask for assistance.

3. Signalman Bradley, at Paragon Station signal-box, stated that three signalmen were employed between 8.30 a.m. and 1.30 p.m., and that movements into and out of platforms Nos. 1 to 10 inclusive were dealt with from the Station box. The Scarborough train, in accordance with common practice, stood in No. 1 platform, and drew up to the starting signals about 9.6 a.m., when he was able to lower signals Nos. 52 and 51 for its movement out of the platform. There is only one way out of No. 1 platform as far as Park Street signal-box, i.e., by C road. With regard to the Withernsea train, in his experience (4½ years) it had been the custom to signal it into No. 3 platform, and as a rule this train arrived in No. 3 platform before the Scarborough train left No. 1. The Withernsea train either travelled by B road as far as Park Street bridge and then moved over the scissors crossing into No. 3 platform, or was turned at Park Street signal-box from B to D incoming road. In either alternative it crossed the track of the Scarborough train.

either in front of Park Street signal-box or immediately east of Park Street bridge. Bradley declared that the only failure of points or signals worked electro-pneumatically had been failures to move when the correct lever contact had been made. He had never heard of any case where a set of points or signals had been reversed from the normal position owing to extraneous currents. He thought that the total number of scheduled passenger train movements into and out of Paragon Station in 24 hours was about 200. With light engine and empty train movements added, the total might be as much as 700.

4. In Park Street signal-box three signalmen were on duty, viz., Alfred Campling, Edwin Gibson and John Clark. Campling had done eight years' service at Paragon Station signal-box, and eight years at Park Street, and had therefore a total experience of 16 years of electro-pneumatic operation of points and signals. He was chargeman in Park Street on the day of the accident from 6 a.m. to 2 p.m. He explained that the arrangement, since signalmen had been put on an equality, has been for them to take in turn the duty of chargeman for periods of three weeks at a time. The division of the work was for the chargeman to take all duties at the west end of the box, to deal with all signalling work of trains in and out of Nos. B, C, D and E roads, and also to act as traffic regulator. The chargeman gave instructions to the other two signalmen if there was any doubt, but usually the men know their own duties and do not wait to be told. If they are in doubt they appeal to the chargeman. Campling at the time of the accident was therefore responsible for all bell signals in connection with movements of trains in and out of B, C, D and E roads and for all movements of levers Nos. 0 to about 70. Clark worked levers Nos. 70 to about 130, and Gibson the remainder.

Campling stated that they had just completed the movement of an empty carriage train from C road through 59 points into the empty carriage road, and had obtained "clear" for the Scarborough train from West Parade signal-box on C road, when they received the bell for that train from Paragon Station signal-box. He then said "Right away Scarborough" to Gibson. The latter would thereby be authorised to pull levers Nos. 171, 169 and 174; the last two of these levers (respectively) authorise and give release for the lowering of the starting signals out of No. 1 platform. No. 171 is the home signal for Park Street for C road, and is carried on a bridge over all lines on the west side of Park Street bridge. Before lever 171 can be worked No. 95 facing slip-points on C road have to be in their normal position. On these points there is a lock and bar (40 feet long) worked in unison with the points by lever 95. Campling was therefore satisfied that No. 95 points were in their normal position, and bolted in that position when No. 171 signal was pulled by signalman Gibson. The Withernsea train was offered to Campling from West Parade signal-box after he had obtained acceptance on C road for the Scarborough train, and Campling offered the Withernsea train forthwith to the Station box. The signalman at that box accepted the Withernsea train on D line, and gave the necessary release for Campling to lower Nos. 14 and 11 signals on B line, after the road governed by No. 11 signal had been set. The movements necessary to obtain Nos. 11 and 14 signals were to reverse Nos. 96 and 83 points and bolt the points 95, 95 and 83, which involved working levers Nos. 96, 97, 94, 83 and 82. Whilst the Station Yard box was giving the release for the Withernsea train to move on to D road, the Scarborough train was approaching 171 signal, and Campling said to Clark, who was working the middle portion of the lever frame, "B to D for Withernsea when Scarborough is out." Before this could be done Gibson had to replace levers 174 and 169, which Campling stated he would do immediately the signalman at the Station signal-box replaced his starting signals to danger, and subsequently to replace signal lever 171 when the Scarborough train had passed it. Campling stated that after he had given Clark the instruction about the Withernsea train he was himself concerned with the departure of the 9.5 express for King's Cross out of the Station on E road; and also with an incoming train from Brough due at Hull at 9.8 a.m., which had been signalled to him from West Parade signal-box on D road. There was also a further movement in the engine yard to be attended to. Campling therefore was unable to speak in respect of the action of either Gibson or Clark in regard to the movement of the signals or points above-mentioned. The first intimation he received that anything might have gone wrong with the Scarborough train was a remark by Gibson when the Scarborough train was just disappearing out of sight—"Where has that chap gone?" and Campling

said, "What chap?" Gibson replied, "Well, I thought the Scarborough train looked a little bit too far over." Owing to the curvature, however, the train had passed out of view when Campling tried to get a sight of it.

Prior to his attention being drawn by Gibson to the position of the Scarborough train, it had been attracted by signalman Clark, who was in difficulties with No. 82 lock bar lever. This lock bar had been pulled for a previous movement of a train through 83 points, and the lock bar had to be withdrawn by replacing 82 lever before Clark could reverse 83 points for the passage of the Withersea train on to D road. Campling went to find out what was wrong, and Clark told him he could not get the normal, i.e., unlocked indication, on lever 82. So Campling went to the Power House bell to ring for the fitters. After telephoning he returned to Clark, and found he had reversed 96 points and that 82 lock bar lever was still in its half-way over position. Campling stated that there was a speed restriction between Park Street signal-box and Paragon Station of 10 miles an hour, but that it applied to incoming and not to outgoing trains. He admitted he was not a speed expert, but thought that with average acceleration a train leaving Paragon Station would not attain a speed of more than about 10 miles per hour when it arrived at the bridge carrying No. 171 signal. He declared that in his experience he had found the electro-pneumatic method of working points and signals quite satisfactory and reliable. The only failures he was aware of were technical failures, e.g., at 7 a.m. on the 17th February there was something wrong with No. 171 signal. It could not be reversed, and the fitter found on examination that the detectors on No. 95 points were holding up the signal, and put it right. He considered that the Scarborough train must have taken No. 95 points in their reverse position in order to have got on to B road, and did not know by what means these points could have been reversed, if it had not been by lever movement.

Signalman E. Gibson, with nearly 47 years' employment on signalling duties, stated that he was employed at Park Street signal-box when it was first opened for electro-pneumatic working in 1905, and had been a relief signalman for the past 13 years. He came on duty at 8 a.m. on the 14th February, and worked at the Station end of the signal-box, being responsible for all movements connected with levers Nos. (about) 130 to 174. He agreed that all the signalmen employed had sufficient experience and knowledge to act in the position of chargeman. He pulled the levers working the controls Nos. 169 and 174 and signal No. 171 for the Scarborough train. After this he pulled over the levers for the release and signal for the 9.5 a.m. train on E line, and had a further shunting movement in hand on F line, which he thought preceded the lever movements in connection with the Scarborough train. He had no bell signals to attend to at the time, and had left the signal standing at "clear" for the shunting movement. His next duty was to replace the levers which had been worked for the Scarborough train. The control slots on the starting signals from No. 1 platform are replaced by putting lever No. 174 in its normal position, and the practice was to do this as soon as the signalman saw the train was well past the platform starting signals. Gibson continued that it was the practice to observe the red light indicator over No. 169 lever, which informed them that the Station Yard signalman had replaced his back lock on the release, before replacing the release lever 169 in its normal position. With regard to replacing No. 171 signal lever, it was his practice to wait until the train and about three coaches had passed the bridge carrying the signal, and then to put the lever back. After doing this on this particular occasion, he was concerned in making similar movements in connection with the signals for the 9.5 express, which had left the Station and was coming forward. In ordinary circumstances he would have had no further reason for concern with regard to the passing of the Scarborough train, but he remembered that his attention was drawn about that time to a remark by signalman Clark, who was working the centre of the frame. The words he heard were, "I cannot get . . ." and presumed that Clark was referring to a particular lever, but did not hear the number of the lever. After placing the signals at danger behind the 9.5 a.m. express, Gibson moved down the frame to see whether the Withersea train had come to a standstill at No. 11 signal. It would be his duty in that event to make a note of the delay to the train. His attention was then drawn to what appeared to be an unusual position of the Scarborough train, inasmuch as it seemed to be further northward than would normally be the case if it was travelling on C road. He then remarked "Where is that chap gone to?" referring, of course, to the

Scarborough train. At this particular moment the rear vehicle of the Scarborough train was, he thought, passing No. 11 signal. He had heard Campling call out to Clark to set the road for the Withernsea train from B to D, and after noticing the out of position apparently of the Scarborough train, he looked at the lever frame and saw that Nos. 97 and 96 were pulled over and that No. 82 lock bar lever was half-way over only. He could not understand how the Scarborough train could have got on to B road unless No. 95 points were lying in position for that road. Gibson spoke highly of the electro-pneumatic signalling now in use at Hull. He had, of course, for many years worked 171 signal and the facing slip-points 95, and it had never occurred to him that there was any danger whatever in the distance that separated the signal from the points. Since full detection had been provided he had never known of any case of points being operated except by electrical contact due to lever movement.

Signalman John Clark had 46 years' continuous service connected with signalling. He was qualified as a special class relief man in 1910, and had worked as a relief signalman at Park Street on many occasions for a day up to 11 months at a time. He was on duty at Park Street signal-box on the 14th February from 5.30 a.m. until 1.30 p.m., and had worked at Park Street for three weeks continuously prior to this particular occasion. He agreed with the system described by signalman Campling in respect of taking over chargeman's duties, and stated that from 5.30 to 8 a.m. he worked at the east end of the frame, which included working the block signals for F and G lines, and the booking necessary in connection with train delays. After 8 a.m. the signalman who then came on duty took over the east end of the frame and his predecessor worked the centre of the frame. As a round figure Clark said he worked levers from 60 to 120. He heard Campling say to him "Set B to D for the Withernsea when the Scarborough is out." He understood this to mean that when the Scarborough train was clear, the road was to be set for the movement of the Withernsea train from B to D road. At that moment he had no other work to do, and was therefore waiting to set the road for the Withernsea train. For this movement he had to pull levers 97, 96, 94, 83 and 82. In front of Park Street signal-box there are six running roads and two siding roads north of the running lines, with complicated crossings. Clark stated that as soon as he saw Gibson put his lever working 171 signal into the normal danger position, he began working the levers in connection with the movement of the Withernsea train. He pulled 97 and 96. He then tried to pull 94 bolt bar lever, but could not get the reverse indication, so he left the lever pulled over in its intermediate position. He then tried to put 82 lever back in the frame, but failed to do so, as he could not get the normal indication. It was necessary to put 82 back in order to reverse 83 points. Whilst he was trying to get 82 lever back he heard Gibson say something about the Scarborough train being too far over, and, looking in that direction, saw the end of the Scarborough train just as it was passing somewhere near No. 11 signal. He did not realise then that the train was on the wrong road. He had not the slightest idea how the train got on to the wrong road, and did not think it was possible that he could have pulled 95 points instead of 96, from the fact that 95 and 96, being interlocked, cannot be pulled together, and that when Campling's attention was drawn to the position of the levers 96 was pulled over. He thought, if he had pulled 95 points, he would not have had time to put them back, being engaged in trying to get 82 lever into its normal position. He thought the electro-pneumatic system of operating points and signals was not so reliable as he could wish. He instanced a case that same morning where a signalman after pulling 59 points obtained the reverse indication, but was not able to get 58 disc signal for a backing movement into the North sidings. When questioned with regard to No. 94 bar, the lever which he stated he had left standing in the intermediate position, he was unable to say when the lever was put back into its normal position from the intermediate position.

5. The enginemen with the Withernsea train were driver Robert Kirby Dixon and fireman Thomas Scott. Dixon had had 28 years' experience of driving, and was accustomed to driving trains from Withernsea. He drove from the right-hand side of the footplate, and was satisfied that the continuous Westinghouse air brake was in good order and condition. On the 14th February the 8.22 a.m. train left Withernsea on time. Delay was caused on the journey by stoppages at signals, and Dixon thought they were eight or nine minutes late as they approached West Parade box. The usual speed of these trains at West Parade signal-box is about

15 miles an hour, partly on account of the sharp curvature on the railway before the signal-box is reached, and partly by reason of a speed restriction to 10 miles an hour between Park Street and the terminal station. That morning Dixon shut off steam at Botanic Gardens advance signal, and passed West Parade box at the usual speed. He had his hand on the brake handle, but the brake was not applied as the train passed under Argyle Street bridge. On emerging from under this bridge Dixon looked forward to the starting signals for West Parade and saw that the right-hand of the two signals, which applied to B road, was "clear." He then dropped his eyes and saw an engine approaching and immediately applied the continuous brake to its fullest extent. He thought that the train did not move more than two engine lengths before they came into collision with the train in front of them. He thought the actual speed of his train at the moment of collision was probably 12 to 13 miles an hour. It was common practice for this train to move from B road on to D road and run into No. 3 platform. Dixon was unable to say whether the Scarborough train was actually moving at the time of the collision, but, if so, it was only at some slow speed. He had never experienced any difficulty in working into or out of Paragon Station. He would certainly prefer to work into and out of Paragon than he would at Leeds, York, Doncaster and Scarborough Stations.

Fireman Scott thought that the speed of the Withernsea train passing under Argyle Street bridge was between 16 and 20 miles an hour. He was not employed on engine duties at that time, and was standing on the left of the footplate looking out for signals. He saw the train in front either just before, or at the same moment when, the driver applied the continuous brake. He did not think that there was more than an engine length between the trains when the brake was applied. He thought that at the moment of the collision the speed of the Withernsea train was 14 or 15 miles an hour. It was not possible to have realised that the train in front was on the same road that they were travelling on, until they had passed through Argyle Street bridge.

Passenger guard Billamy rode in the last vehicle but one on the Withernsea train. He tested the continuous brake from the last vehicle before the train left Withernsea, and noted the pressure afterwards rose from 40 to 70 lbs. The brake was used at four single line staff stations on the journey to Hull. The train was stopped at Stepney, and passed Botanic Gardens at no higher speed than 20 miles an hour. He did not notice any application of the brake prior to the collision, and judged the speed to have been not more than 15 miles an hour when the crash took place.

6. Driver Samuel Atkinson was on the engine of the Scarborough train, and had had 27 or 28 years' experience of driving. He had been acquainted with Paragon Station for the past 25 years, and came on duty at 4.32 a.m. on the 14th February to book off ordinarily about 12.20 p.m. He was off duty the day previous. Atkinson stated that the Scarborough train was standing about half-way down the length of No. 1 platform, and the engine slipped about twice on the platform line as they moved towards the starting signal. He had to use the sanders to check the slipping. On this account, he thought the train would accelerate less quickly than usual. They were signalled out of No. 1 platform on to C road, and he judged that the speed of the train when his engine reached the home signals for Park Street was about 10 miles an hour, or perhaps something more. The signal he received was the centre of three signals all referring to C road and was applicable to a continuous straight movement on C road as far as West Parade box. He could also see that all the signals were off as far as Victoria Crossing. His eyes were raised looking for these signals as he passed Park Street signal-box, and he thought that the speed of the train had then increased to 15 or 20 miles an hour. He felt no movement on the engine which would attract his attention to the fact that the engine was moving away to the right over the crossing, and it was only when he lost sight of the West Parade home signal, the right-hand of three signals applicable to C road, that he thought something must be wrong. At this moment he had passed the bridge carrying the down home signals for Park Street. He thought his position—at the moment he fully realised he was on the wrong road—was opposite the water crane which is situated outside sidings on the north side of A road. It was actually the water crane which created

the impression on his mind that he was out of position, and he then crossed over to the left-hand side of the footplate to verify his impression, and recrossed to the right-hand side before shutting off steam and applying the brake. Some five seconds or so must therefore have elapsed after he had passed the water crane when he applied the brake. At that time the speed of the train, he thought, would be between 20 and 25 miles an hour. He immediately shut off steam and fully applied the continuous brake, which had its usual retarding effect, so that the train was practically stopped before the actual collision took place. He thought that the engine ran forward about a train length after the brake had been applied. He was quite certain that there was no sort of movement or throw on the engine as it passed through the points leading from C road to B road, and was not aware that there was a train approaching him in the facing direction at the moment he shut off steam and applied the brake. But he saw the engine of the Withernsea train just after it had emerged from under Argyle Street bridge. His train might have been just moving at the moment of collision, but no more. As a result of the collision he was buried in the coal from the tender, and when he was able to get down on to the ballast he sat down to recover himself. He then walked to Park Street signal-box and saw signalman Campling. Knowing that Campling was in charge, he said to him, "What are you playing at this morning?" Campling turned round to Clark, one of the other men in the box, and said, "Did you pull that lever over?" Clark, however, made no reply. He saw that the signalmen were a bit flustered and said no more, but came out of the signal-box. Driver Atkinson thought the working at Paragon Station, Hull, was simpler than either at York or Leeds.

Fireman Charles Wilkinson was with driver Atkinson. He stated he did not take up any of his engine duties until after they had passed Park Street signal-box, so that he should be free to assist the driver in viewing the signals. He saw that the signals at West Parade were clear for them, and naturally concluded they were on the right road. He felt no unusual movement or throw on the engine such as might be caused when it moved over the points and crossing leading from C road to B road. He was engaged in firing when the driver stepped over to his side and then crossed back to his own. Immediately afterwards he noticed that steam was coming out of the chimney. This told him that Atkinson had shut off steam. It was during these movements that Atkinson said to Wilkinson, "Look out," and he then looked out in front and saw the train in front of them.

Passenger guard Carr, who rode in the last vehicle but one of the Scarborough train, stated that he tested the continuous brake from the last vehicle before the train started, and observed the pressure in the gauge rose afterwards to 75 lbs. He thought the speed of the train was not more than 10 miles an hour when it reached Park Street home signal bridge. He did not notice that the train took the points leading over the crossing to B road. The application of the continuous brake by the driver was the first intimation he received that anything was wrong. He went to look out of the window to find out the cause of the application, but before he had time to look out he was thrown to the rear end of his van by the shock of the collision. He thought that the train was moving when the collision took place.

7. Edward Varey, electrical chargeman at Paragon Station, stated that he had been in charge of the electro-pneumatic working for 8 years. He had never known of a case where point switches had been operated other than through the medium of signalmen's levers, except when they were being tested, after permission had been obtained from the signalman to do so. He thought that in this particular instance 95 points must have been moved from their normal into their reverse position. If such a movement were possible owing to induction or other reason, the points would not return into their normal position. He examined the points and bars after the accident and found no mark on the lock bar, or any damage to 95 points. There was nothing wrong either with 94 lock bar at the other end of 95 points. But the two stretchers on each side of the bolts at 83 points were bent, and also the swan-neck detectors. The bar at 83 points was not damaged. He came to the conclusion that 83 points had been run through in the wrong position by a trailing movement. He had had to take the stretchers out of 83 points, heat them and straighten them. They had to deal with failures such as are caused by some slight inaccuracy in the position of point blades. These failures, to which they were

accustomed, were, of course, "Safety" failures. About three quarters of an hour after the accident Varey saw No. 95 points operated from the signal box by lever in the usual way. No complaint had been received with regard to the working of 95 points or 171 signal that morning. A daily report was sent to the Signal Engineer so that he would know if any of the failures reported were on the danger side.

8. Evidence was also given by Permanent-Way Inspector William Watson, whose office is close to Park Street box. He examined the permanent way and through crossing, on which are situated No. 95 points, about an hour after the accident, with ganger Brown. They found 95 points in perfect order. There were no marks of any wheels riding on or crossing over any of the rails. Nor was there anything wrong with 94 lock bar at the west end of 95 points. They found the switch blades at 83 points slightly damaged. The condition of the switches at 83 points was such as would result from a train running through them in the trailing position when they were closed. It would not have been possible for a train to have got from C to B road without 95 points being actually set for it. Otherwise the crossing would have been knocked to pieces.

Inspector John Neary examined the joints and connections between the electrical motors and the actual points and bars of 82, 83, 94, 95 and 96. There was no damage to any of the connections except in respect of 83. He afterwards tested the locking between Nos. 95 and 171 levers, and found that 171 signal lever was locked when 95 points were pulled over. They tried it in the reverse position, and found with 171 pulled over that 95 point lever was locked.

Report.

I. This disastrous head-on collision was caused by the Scarborough train, after acceptance had been given and the proper signals lowered for it to proceed on C outgoing road past West Parade Junction signal-box, being diverted on to B facing ingoing road, upon which the Withernsea train was approaching the terminal station. I can recollect no case of an accident having occurred in similar circumstances.

The evidence of the signalmen proves that the Scarborough train was properly signalled on C road throughout from the Station signal-box to West Parade Junction signal-box. There is no doubt also that it crossed from C road to B road through 95 facing slip-points and 83 points.

Permanent-Way Inspector Watson, Signal Inspector Neary, and Electrical Chageman Varey prove by their evidence that the only damage found on the crossing after the collision was some buckling of the stretcher rods on each side of the locking bolts, and bending of the swan-neck detectors and switch plate ends of 83 points. Their evidence firmly establishes the fact that 95 points must have been reversed, i.e., set for the crossing, when the Scarborough train passed over them. Further, the damage observed to 83 points shows that these points were set in the normal position, i.e., against the crossing, and were run through by the Scarborough train in the trailing direction.

The question for decision, therefore, is how 95 points came to be reversed having regard to the locking. Levers 95 and 171 are so mechanically interlocked in the lever frame in Park Street signal-box, that it is impossible either to lower 171 signal except when 95 points are normal, i.e., set for the straight run over C road, or to reverse 95 points except when 171 lever is in the normal, i.e., danger position in the frame.

II. The first possibility for consideration is whether lever 171 was replaced in the frame early enough—having regard to (a) the position of the Scarborough train on C road, (b) the actual speed of the train, and (c) the time required for reversing 95 points by lever and motor movement—to permit of 95 points being reversed, before the leading bogie wheels of the engine had reached the locking bar to the points, which would have prevented the reversal of the points. The locking bar at 95 points is 40 feet in length and is worked simultaneously with the points by the same lever.

(a) Signalman Gibson was responsible for the movement of lever 171. He followed his usual practice on this occasion, and replaced the lever when the engine

and about three coaches had passed the bridge carrying signal No. 171. Before the lever could be moved past its half-way position in the slide, and the mechanical interlocking with No. 95 lever be thereby freed, it was necessary not only for the signal motor to operate and bring the signal into its normal danger position, but also for the return electrical indication to be received at the lever frame, showing that the movement had been properly completed. The whole operation would occupy about two seconds. Assuming that lever 171 was returned to its normal position at the moment when the third coach behind the engine had passed the signal bridge, the leading bogie wheels of the engine would be 219 feet $2\frac{1}{4}$ inches beyond the signal bridge, and 37 feet $9\frac{3}{4}$ inches from the nearest (east) end of the locking bar at 95 points.

(b) With regard to the speed of the Scarborough train whilst travelling between the signal bridge and 95 points, it should first be noted that the distance from No. 1 platform starting signals to signal 171 is approximately 131 yards, that the engine wheels slipped twice whilst leaving the platform, sand having to be applied, and that a scissors-crossing had to be traversed by the engine and train before C road was reached. The west end trailing points of the scissors-crossing are situated on C road about 78 feet east of the bridge carrying 171 signal.

The speed of the train, as estimated by driver Atkinson, was about 10 miles an hour when he reached the home signal-bridge, and from 15 to 20 miles an hour when he passed Park Street signal-box. Passenger guard Carr, who rode in the last vehicle but one of the Scarborough train, thought that the speed of the train was not more than 10 miles an hour when he passed Park Street home signal-bridge.

Tests were made by the Company of the speed of trains of similar composition on the 10th, 11th and 12th March, with the result that the average speed of the three tests, over the 86 yards of space between the signal bridge and the locking bar at 95 points, was $17\frac{1}{2}$ miles an hour. But it was considered by the Company's officers that the rails may have been in a better condition on the three days when these tests were made than on the 14th February, which would account possibly for the lower speeds estimated by driver Atkinson.

It is, moreover, quite possible, I think, that signal lever 171 may have been replaced by signalman Gibson before the whole of the third coach had passed the signal bridge.

Assuming, however, a speed of 13.75 miles per hour, i.e., the average of the speeds estimated by driver Atkinson, the time required for the leading bogie wheels of the engine to travel the distance of 37.81 feet would be 1.9 seconds.

(c) With regard to the time required for reversal by motor machine of 95 points, I found, with the assistance of Mr. H. D. Rudguard, Assistant Engineer, that as a result of six tests the average time required to throw 95 points and locking bar was 1.6 seconds.

I regard it, therefore, as possible for 95 points to have been reversed, after lever 171 was replaced at normal, before the leading bogie wheels of the engine of the Scarborough train reached the locking bar to 95 points.

Signalman Clark was in charge of that part of the lever frame which included levers 82 to 97. He was instructed by signalman Campling to set the road for the Withersea train from B line to D line after the Scarborough train had passed. As soon as he saw signalman Gibson put lever 171 into the normal danger position he began working the levers in connection with this movement. He stated he pulled levers 97 and 96, and then tried to work 94 lock bar lever at the west end of 95 slip points. But, being unable to get the reverse indication, he left the lever in its half-way position and tried to replace lever 82 (lock bar to 83 points) into its normal (unlocked) position, in order to reverse 83 points for the Withersea train. But again he could not get the normal indication. It is probable that the reason he was unable to reverse 94 and replace 82 levers was because the Scarborough train was at the time passing over the lock bars. He thought it was not possible that he could have moved 95 instead of 96 points, because 96 points were subsequently found in the reverse position, when Campling's and Gibson's attention was drawn to his difficulties in connection with No. 82 lever. He was unable to say when he replaced 94 lock bar lever in the frame from its intermediate position.

III. In view of signalman Clark's deposition, I thought it necessary to consider an alternative, though improbable, explanation for the reversal of 95 points. On Sunday, the 20th March, therefore, I tested the likelihood of a movement of 95 points, owing to possible earthing or connection of the reversing electrical leads of 95 and 96 points, by connecting the two leads and then trying the effect of reversing No. 96 point lever. I found, as might be expected, that the only result was to energise the reversing magnet (M. 2) of 95 point machine, and thereby open the pin valve on the reversing side of the slide valve cylinder. No movement of the piston in the main cylinder resulted, for the reason that the magnet (M. 1) on the normal side was not de-energised, and no movement therefore resulted in the slide valve cylinder, which controlled the admission of air pressure into the main cylinder. The experiment proved, in my opinion, that no earthing or contact between the reversing leads of Nos. 95 and 96 would, if 96 lever had been reversed, have resulted in a movement of 95 points; nor would the fortuitous picking up of a stray current through earthing of 95 reversing lead, unless the normal lead had been broken, have resulted in the points being thrown over. A combination of the two last-named conditions is too improbable for serious consideration, and moreover it would not have been possible to replace the points in their normal position as was subsequently done.

IV. The only explanation, therefore, which appears possible to account for the diversion of the Scarborough train from C road to B road is that signalman Clark, instead of pulling No. 96 points as stated in his evidence, must have inadvertently pulled and reversed 95 points before the engine reached the locking bar.

V. General Rule 61 (b), which covers the replacement of signals in a case of this description, reads as follows:—

"When a signal other than a distant signal has been lowered for the passage of a train, it must not (except in the case of accident or obstruction) be again placed at danger until the last vehicle of the train has passed it, or the train has been brought to a stand; nor, in the case of a junction, until the last vehicle of the train has passed it, and is clear of the junction points."

The total length of the Scarborough train was about 110 yards, and if signalman Gibson had acted strictly upon this rule the leading engine wheels would have reached 95 points before the signal had been replaced, and the wheels of the train would have been on the bar to the points. It would not then have been possible for the points to be reversed, and the accident would not have happened.

The Superintendent (Mr. Jenkin Jones) in his evidence stated that no definite instruction had been issued authorising any departure from Rule 61 (b). But that, in the interest of safety, there was an understanding which allowed the signalmen at Park Street to use their discretion in replacing the signals in question to danger before the last vehicle had actually passed them. He explained that it was the normal practice for the light engine which brought in the empty stock for the Scarborough train to follow the train when it left the platform. In this case he thought the signalman was justified in putting the signal back to danger before the last vehicle had passed, in order to avoid all risk of the "clear" signal being taken as authorisation for the light engine following the train to pass the signal. This practice is one which is common on railways at terminal stations, where it is necessary to clear platforms as rapidly as possible, and release engines for other duties.

VI. Another and, I think, more important Rule, 60 (a), reads as follows:—

"When a train is approaching Facing Points the Signalman must see that the lever which governs them is close home to the frame, and that the catch is firmly down in the notch, and remains so until the whole of the train has passed."

This Rule implies that whether the signal holding the points has been replaced at danger or not, a lever controlling points over which a train has to pass must be kept in the correct position. Mr. Jones also considered that a signalman would not be justified in moving 96 points on D road, until after the train had passed the through crossing, although the movement of 96 points, which was also interlocked with 171 signal, would not have caused any diversion or accident to the Scarborough train. I fully concur in these views, and consider that signalman Clark should have observed the position of the Scarborough train on C road, and not have attempted to make any lever movement required for the passage of the Withernsea train until the Scarborough train had passed clear of 95 points and the through crossing.

VII. The root cause of this accident is, I think, psychological—there is a human factor to take into account. The Withernsea train was already late, but had been signalled to Park Street signal box as “entering section.” If this train had been stopped at No. 11 signal on B road, owing to its arrival at the signal post before the points could be set from B to D road, it would have been signalman Gibson’s duty to record the fact. It is human nature for men, who take an honest pride in their work, to avoid if possible having to book the stoppage of a train, especially one already late, at a signal for the working of which they are responsible. It is possible, therefore, that for this reason both Gibson and Clark acted more hurriedly on this occasion than they should have done. Gibson may have replaced 171 signal somewhat earlier than usual, and Clark, with his eyes fixed on Gibson’s movements, instead of on the train, so that no time should be lost in setting the road for the Withernsea train, began pulling his levers before the Scarborough train had passed, and made the disastrous mistake of pulling 95 instead of 96. Mr. Jones assured me that in the circumstances, with a train so late, he would certainly not have blamed a signalman if it had been checked by signal.

VIII. The following additional points were dealt with at my Inquiry:—

(a) It was stated that the traffic had grown so considerably since Paragon Station had been reconstructed, especially since the war, and that the lay-out was so complicated, that there was inherent danger in working the traffic.

The Company submitted figures showing that the number of trains dealt with both into and out of Paragon Station during a normal 24 hours was as follows:—

	1906.	1914.	1920.	1926.
In-going trains	85	107	85	106
Out-going trains	89	108	83	104
Totals	174	215	168	210

The figures suffice to show that about 20.7 per cent. more trains are now worked into and out of the station during 24 hours than in 1906, and about 2.3 per cent. less than in 1914.

The lay-out of the Station yard and platforms is shown on the attached diagram, upon which, however, all the signals are of course not indicated. I took the opportunity of consulting drivers Dixon and Atkinson and Station Inspector Brant, as well as the Company’s officers. The drivers, men with about 28 years’ experience of driving, stated that in their view the lay-out of the lines in Paragon Station Yard was simpler and easier for enginemen to work over than at other centres, such as Leeds, York, Doncaster and Scarborough. Inspector Brant, who had had 20 years’ experience of the traffic movements in Paragon Station, and had played a leading part in arranging for the arrival and departure of trains, stated that no difficulty had been experienced in respect of working or crossing trains, as found necessary, to and from the various platforms. So far as practicable the platforms detailed for trains were arranged so that there should be as little crossing as possible. Trains from Hornsea and Scarborough arrive at and depart from platforms on the north side of the Station, whilst main line trains are accommodated at the south side platforms.

In my opinion the lay-out of the lines and platforms at Hull is no more complicated, and the traffic is much less in bulk than at many other large terminal railway centres. Traffic working must naturally be complicated in character at all termini owing to movements of empty stock and light engines, the unavoidability of reversing all trains, and the necessity for providing access from all platforms to engine and stock sidings. It should be noted from the diagram to what a small extent the running lines are used in both directions.

(b) With regard to locking the doors of one or two compartments next to the engine as a protection to passengers in the event of accident. In the old days, when compartment stock consisting of 4 and 6-wheeled vehicles with wooden frames was almost entirely in use, Railway Companies generally adopted this practice as far as practicable on express, but not on slow passenger trains. With the adoption of

steel under-frames of greater strength the practice gradually fell into disuse, and eventually the construction of corridor vehicles made it impossible to carry the practice into effect. It should be noted that in the case of the Withernsea train there was telescoping in all of the first five vehicles, owing to the exceptional circumstances of a direct head-on collision.

No regulations on the subject have been made either by the Board of Trade or the Ministry, chiefly because the position in a train at which telescoping may occur is uncertain, and (of late years) it has been considered that by shortening the length of the couplings, and strengthening the under-frames and ends of passenger stock, better security could be afforded against telescoping.

(c) I have also to state that, in the newspaper reports of the first day's proceedings of this Inquiry, a statement appeared in a number of London and Yorkshire newspapers to the effect that the railway representatives had objected to the Inquiry being held in public. In fairness to the London and North Eastern Railway I have to report that no representations to this effect were made to me by any railway officers, and that there was therefore no ground for that statement.

Conclusions.

My conclusions in this case are:—

(1) That signalman Clark diverted the Scarborough train from C (outgoing) to B (incoming) road, by inadvertently moving 95 instead of 96 points, before the leading wheels of the engine reached the bar to those points, and that he should have watched the train pass No. 95 points before attempting to reverse 96 points. I therefore place responsibility for the collision upon him. It is possible that the desire of both signalmen Gibson and Clark to avoid checking the Withernsea train at No. 11 signal resulted in more hurried action than was advisable, both in connection with the replacement of 171 signal and the working of the point, etc., levers for the movement of the Withernsea train from B to D road.

Anxiety to avoid checking the Withernsea train may have been a feature in this case, and it is desirable that the Company should caution signalmen against the danger of overlooking the obligation of paying due regard to the Rules quoted. Mr. R. L. Ferguson, District Superintendent, stated that all the signalmen who were on duty in Park Street signal-box, had first-class characters, and were regarded as first-class signalmen.

(2) I do not consider that any responsibility can be placed on the enginemen (Dixon and Scott) of the Withernsea train, whose view of the road before them was much circumscribed by track curvature and the existence of Argyle Street bridge. Nor do I think that serious blame attaches to the enginemen (Atkinson and Wilkinson) of the Scarborough train. They were perhaps not so alert as they might have been, otherwise, with so long an experience, driver Atkinson might have realised his position on the wrong line at an earlier moment than he did. On the other hand, having seen his signals were clear on C line as far as Victoria Crossing, an extraordinary diversion such as took place could certainly not be anticipated, and misleading security would be afforded by the clearance of the proper signals.

(3) I do not think that this accident, or the previous one on the 5th February, was in any way caused by unnecessary complications of lay-out and crossings in the Station Yard.

(4) As a safeguard against similar occurrences, I am not in favour of additional signalling, nor do I think that intermediate, electrical or mechanical clearance bars would be suitable, in view of light engine traffic. I therefore recommend the Company to provide a track circuit on C road between No. 171 signal and 95 points, which would hold the points whilst any train was moving towards them.

I have the honour to be, Sir,

Your obedient Servant,

J. W. PRINGLE,
Colonel.

The Secretary,
Ministry of Transport.

APPENDIX I.

Damage to Engine No. 96.

Main frames badly bent at front end, and behind the cylinders.
 Bogie frames bent and bogie badly damaged. Centre bogie pin bent.
 Leading bogie axle bent.
 Both leading bogie axle boxes broken.
 Smoke box badly damaged, and forced away from the frame at the bottom.
 Front buffer beam badly damaged, and both buffers broken.
 Leading draw bar and coupling badly bent.
 Footplate at the front end badly damaged.
 Westinghouse and vacuum pipes damaged.
 Steam heater pipes damaged.
 Brake gear on driving wheels bent.
 Tender buffer beam bent.
 Back of tank badly damaged full width.

Damage to Engine No. 1628.

Main frames badly bent at the front end, and also at the back of the cylinders.
 Bogie frames bent.
 Leading bogie axle bent.
 Leading bogie axle boxes broken.
 Motion plate broken.
 Left connecting rod bent.
 Smoke-box badly damaged, and forced away from the frames at the bottom.
 Front buffer beam badly damaged, and buffers broken.
 Leading drawbar and coupling badly bent.
 Footplate badly damaged at front end.
 Westinghouse and vacuum pipes damaged.
 Steam heater pipe damaged.
 Brake gear broken.
 Tender buffer beam damaged.
 Both buffers broken.

APPENDIX II.

*Damage to Carriage Stock.**(a) Withernsea Train.*

No. 2500. Completely destroyed.
 No. 23236. Leading bogie displaced, but not derailed. First five compartments telescoped. Frame and bogies badly damaged.
 No. 2453. Two compartments telescoped. One bogie displaced and bent. Brake work badly bent and broken. Body frame bent.
 No. 2495. Telescoped and completely wrecked.
 No. 2716. Derailed all wheels. Van portion telescoped. Bogie badly damaged and brake work bent.

(b) Scarborough Train.

No. 3263Y. Front half telescoped. Practically wrecked.
 No. 3355Y. Headstock broken.
 No. 22953. Headstock broken.
 No. 3365Y. Two headstocks and sole bar broken. Brake work, pipes, etc., badly damaged.

