MINISTRY OF TRANSPORT

RAILWAY ACCIDENTS

REPORT ON THE DOUBLE COLLISION

which occurred on

28th January 1960

at

BOROUGH MARKET JUNCTION

in the

SOUTHERN REGION BRITISH RAILWAYS

LONDON: HER MAJESTY'S STATIONERY OFFICE
1960
THREE SHILLINGS NET

MINISTRY OF TRANSPORT,
BERKELEY SQUARE HOUSE,
LONDON, W.1
14th March 1960

SIR,

I have the honour to report for the information of the Minister of Transport, in accordance with the Order dated 1st February 1960, the result of my Inquiry into the double collision which occurred at 2.58 p.m. on 28th January 1960 at Borough Market Junction, London Bridge, in the Southern Region, British Railways.

The trains concerned were:—

The 1.0 p.m. Up multiple-unit diesel electric passenger train from Hastings to Charing Cross (The diesel train).

The 2.22 p.m. Up electric passenger train from Hayes to Charing Cross (The Hayes train).

The 2.53 p.m. Down electric passenger train from Charing Cross to Tattenham Corner (The Tattenham train).

The diesel train was running through London Bridge and Borough Market Junction on the Up Local line under clear signals, and it was to precede the Hayes train to Charing Cross. The latter train was on the Up Through line and, after it had stopped at London Bridge, the platform starter was cleared for it to draw up to the next signal ahead. That signal protected the converging junction between the Up Through and Up Local lines and it was at danger, but the Hayes train ran past it and came into sidelong collision with the diesel train at a point 72 yards beyond the signal. The collision forced the rear end of the leading coach of the Hayes train towards the Down line from Charing Cross, and it was struck almost immediately by the Tattenham train.

The speed of all the trains was slow. The leading coach of the diesel train and the leading two coaches of the Hayes train were derailed and they were damaged fairly severely. There were about 115 passengers in the diesel train, 25 passengers in the Hayes train and 98 passengers in the Tattenham train. Seven passengers, most of whom were in the Hayes train, received slight injuries or suffered from shock. One passenger was sent to hospital and was discharged after treatment, while the remainder were given first aid treatment and then continued on their journeys.

The collision caused short circuits which opened the circuit breakers in the sub-stations at Cannon Street, Blackfriars and South Bermondsey and cut off the current from the lines on which the trains were standing, and the electric pressure was removed from the other lines in the area at 3.0 p.m. Emergency calls were made without delay, and ambulances, the Fire Service and the Police were quickly on the site. The passengers were detrained and conducted to London Bridge station or to Borough High Street by 3.30 p.m.

Breakdown equipment was ordered promptly and the lines were cleared and normal services resumed by 5.6 a.m. the following morning, after the damage which had occurred to the track and the signalling had been repaired. In the meantime emergency services were put into operation to deal with the evening home-going traffic. The arrangements included the diversion of main line coastal trains to Victoria and Mid-Kent line trains to Blackfriars and Holborn. Other services were terminated at London Bridge, Blackheath and Maze Hill, and shuttle services were operated on certain lines.

The weather was cloudy and dull, but visibility was good.

DESCRIPTION

The site and signalling

As shown in Figure No. 1 of the attached plan, Borough Market Junction is the point where the 4-track route from London Bridge diverges to Cannon Street and to Waterloo (Eastern) and Charing Cross. It is a most important junction and the traffic through it is extremely heavy. The junction is mainly on viaducts.

Figure No. 2 shows the layout of the tracks in the area and the position of the relevant signals on the Up Through and Up Local lines and on the Down line from Charing Cross. In the Up direction from London Bridge the lines run generally westwards and are mainly on sharp left-handed curves to Borough Market Junction signal box which is about 260 yards beyond the platforms. The 4-track route to Cannon Street then takes a sharp right-handed curve to the North, while the double track route to Charing Cross continues westwards for a short distance before swinging to the left. The Up lines rise at 1 in 109 through London Bridge to a point roughly halfway between the platforms and the signal box, and then fall at 1 in 128 through the junction. Metropolitan Junction is the next box towards Charing Cross.

On account of the severe curvature the speed of trains through Borough Market Junction is restricted to 20 m.p.h.

The signalling installation at Borough Market Junction was brought into use in 1928. The signals are of the 4-aspect colour light type and they are closely spaced. They and the electrically operated points are controlled from a miniature 35 lever power frame in Borough Market Junction

signal box. On the Up Local line the signals concerned in this case are No. 35, the starter from No. 7 platform, and No. 27/28 which is situated at the diverging junction on that line and is 276 yards beyond No. 35. On the Up Through line the starting signal from No. 4 platform is No. 23/29 and it is equipped with a theatre type route indicator; it is 55 yards east of signal No. 35. Signal No. 23 with the letter "T" on the route indicator leads over the Up Through line to signal No. 18/19. The latter signal is situated at the diverging junction on that line and it is 292 yards beyond No. 23. Signal No. 27/28 is in fact one signal which has a right-handed lunar light junction indicator, and it is controlled by two levers. It is referred to as signal No. 27 when, having been cleared by lever No. 27, it controls the route to Cannon Street with the junction indicator illuminated; and as signal No. 28 when, having been cleared by lever No. 28, it controls the route to Charing Cross without the indicator being illuminated. Similarly, signal No. 18 with the indicator illuminated leads to Cannon Street and signal No. 19 without the indicator to Charing Cross. These signals are illustrated in Figure No. 3.

Signals No. 28 and 19 are also controlled electrically from Metropolitan Junction box and neither can be cleared until a slot lever in that box has been reversed. The slot lever releases either signal lever in the Borough Market Junction frame for one train movement only, but the usual mechanical locking in the frame prevents the two signal levers being reversed simultaneously. The reversal of the slot lever is indicated in Borough Market Junction box. When the slot has been given and lever No. 28 or No. 19 has been reversed, the aspect of the signal concerned will clear to yellow, double yellow or green depending on the aspect of the next signal ahead at Metropolitan Junction. When signal No. 23 is yellow the aspect in signal No. 19 is red.

On account of the slow speed of trains, the overlaps beyond signals are short. The overlap beyond signal No. 19 is only 59 yards and in the case of some other signals it is considerably less.

The area is continuously track circuited and the track circuits exercise the usual controls over the signals and points. When a signal has been cleared it is "approach locked" by the occupation by a train of the berth track circuit, but the lever can be placed in the "back-lock" position which replaces the aspect of the signal to red. The locking is released when a track circuit ahead of the signal is occupied and the signal lever has been replaced to normal. In the case of signal No. 19, the berth track circuit is No. 12 and it begins 146 yards on the approach side of the signal. The track circuit next ahead of the signal is No. 13 and when it is occupied the aspect of the signal is replaced to red. However, in the case of signal No. 28, the aspect is replaced to red by the occupation of the second track circuit ahead of the signal, viz. No. 17.

The signal box is provided with an illuminated diagram on which the occupation of the track circuits is shown by lights. The aspects of the signals are repeated separately by coloured lights situated above the respective levers in the frame. There are no block instruments and trains are signalled by block bells and describers. "Train ready to start" plungers are provided on each platform at London Bridge and when operated they provide visual indications in Borough Market Junction box.

Mechanically operated detonator placers are provided and they are worked by separate levers in the box; on the Up Local and Up Through lines the detonator placers are almost opposite to signals No. 27/28 and 18/19 respectively.

Sighting of signals

Signal No. 18/19. This signal can first be seen by the driver of a train on the Up Through line at a distance of 200 yards to the left of a bridge girder between the Up Through and the Up Local lines (i.e. from point A on Figure No. 2); it remains in view for 57 yards till he reaches point B and is then obscured by the girder. It again comes into view beyond the girder at a distance of 80 yards (point C) and it remains in view until it is reached. The signal is focussed towards point C and consequently its light aspect is not brilliant when seen from between points A and B.

The guard of a 4-coach electric train on the Up Through line can get only a momentary view of this signal before its aspect, if at clear, is changed to red by the train occupying the track circuit ahead of the signal.

Signal No. 27/28. This signal comes into the view of a driver of a train on the Up Local line at a distance of 184 yards.

It can also be seen by a driver of a train on the Up Through line at a distance of 165 yards from signal No. 18/19 (point D). It remains in view for a distance of about 22 yards (up to point B) and is then obscured by the bridge girder. It again comes into view just beyond point C. Signal No. 27/28 is focussed towards the Up Local line and its aspects are not brilliant when seen from the Up Through line. A train on the Up Local line a coach length or more ahead of the train on the Up Through line does, however, obstruct the view of this signal from the train on the Up Through line.

When the two signals are both in view from between points D and B and again beyond point C, No. 27/28 is considerably to the left of and less brilliant than No. 18/19.

The trains

The Up diesel train from Hastings comprised 12 bogie coaches made up of two six-coach sets each consisting of two motor coaches with four trailer coaches between them. The coaches

were of all-steel construction and Buckeye automatic couplings were in use between them. The driving cabs were provided with speedometers. The sets were equipped with the Westinghouse and electro-pneumatic brakes and the brake power was 76% of the weight of the train which was 466 tons.

The Up electric train from Hayes was a four-coach "close-coupled" unit consisting of two motor coaches with two trailer coaches between them, all of them being of all-steel construction. It was 257 ft. long. The driving position was on the left hand side of the cab. The guard's brake compartments, adjacent to the driving cabs at each end of the unit, were provided with periscopes. The brake equipment was of the same type as on the diesel train and the brake power was 78% of the weight of the train which was 135 tons.

The Down electric train from Charing Cross to Tattenham Corner comprised eight coaches and it was made up of two four-car sets, both of which were similar to the Hayes train, joined together by a Buckeye automatic coupling.

The collisions

The diesel train was not booked to stop at London Bridge and near the end of platform No. 7, through which it had passed, it was very slightly ahead of the Hayes train which had started from No. 4 platform. The Hayes train then overtook the diesel train to some extent and at signal No. 18/19 it was about a coach length ahead. Consequently, when they converged towards the junction between the Up Through and Up Local lines, the diesel train struck a glancing blow to the rear end of the leading coach of the Hayes train, and forced it and the second coach of that train towards the Down line. The front ends of the second coach of the diesel and the third coach of the Hayes train also came into sidelong contact with each other. The rear bogie of the front coach and both bogies of the second coach of the Hayes train were derailed as also was the rear bogie of the leading coach of the diesel train. The front coach of the Tattenham train which was approaching on the Down line then embedded itself to a depth of about 1 ft. into the rear end of the leading coach of the Hayes train, but it was not derailed.

The damage

The leading and the second coach of the diesel train were damaged, the former mainly superficially and the latter to a minor extent. The first two coaches of the Hayes train received considerable damage, especially the leading coach in which the four rearmost compartments were demolished. Minor damage also occurred to the third coach on that train and to the leading end of the Tattenham train.

Some damage was caused to the track and the signalling equipment.

Evidence

During the day shifts there are two signalmen on duty at Borough Market Junction signal box, one controlling Up traffic and the other Down traffic. On the day of the accident there was also a relief signalman in the box.

Signalman B. W. Bailey had worked in that box for 2½ years; he came on duty at 2.0 p.m. and was controlling Up trains. He recalled that the Hayes train was at platform No. 4 at London Bridge and that he received the "ready to start" indication for it at the same time that he saw on the illuminated diagram that the diesel train had occupied the track circuit on platform line No. 7. The Hayes train was due past Borough Market Junction at 2.57 p.m. and it was about one minute late and the diesel train, which was not booked to stop at London Bridge, was about five minutes late. He therefore decided to keep the trains to their proper order and to allow the diesel train to precede the Hayes train to Charing Cross. Consequently he cleared signal No. 35 for the diesel train, described it to Metropolitan Junction box and, when he saw that the slot had been given by that box, he cleared signal No. 28 and saw its repeater change from red to yellow. At the same time he cleared signal No. 23 for the Hayes train to draw up to signal No. 18/19 and he saw the repeater of No. 23 change to yellow. He did not at that time notice the repeaters of signal No. 18/19 but he had seen that they were red after the previous train had passed it.

Bailey then noticed out of the corner of his eye that the Hayes train was passing the box and he realised that it must have passed signal No. 19 at red. He immediately placed lever No. 28 in the "back-lock" position but noticed that the aspect had already changed to red (by the Hayes train occupying track circuit No. 17). He also at once sent the Obstruction Danger signal in all directions and operated all the detonator placing levers. He then telephoned to the electrical control room at Lewisham and asked for the current to be switched off all the lines.

Bailey was quite definite that he had not changed his mind about the order in which the two trains were to run to Metropolitan Junction. He agreed that if he had cleared signal No. 19 for the Hayes train, he could have replaced it to danger before that train had reached track circuit No. 12, and then re-set the route for the diesel train. He was emphatic, however, that he had not done so and he stated that there was no object in altering a route once set up unless a train was delayed for some reason; he would do it then only after warning a driver.

Signalman S. T. Gore had worked in Borough Market Junction box for 8½ years. He was controlling Down traffic and was supervising Relief Signalman C. J. Watts, who was learning the work; Watts was actually operating the frame for Down trains. Gore was sitting at the time

and saw the repeater of signal No. 35 and then that of signal No. 28 clear from red to yellow for the diesel train. He also saw the repeater of signal No. 23 clear from red to yellow and he was definite that the repeater of signal No. 19 was red. He was also emphatic that Bailey had not changed his mind about the order in which the trains would run to Charing Cross, and he said that that was never done.

Gore first knew that something was wrong when he saw Bailey dash to the detonator placer levers and operate them, and he then noticed on the diagram that track circuit No. 13 ahead of signal No. 18/19 was occupied. He also saw Watts put signal No. 10, which had been cleared for the Down Tattenham train, to red by placing its lever in the " back-lock " position. He noticed at the same time that the train was occupying track circuit AS. He realised there would be an accident and actually saw both the collisions take place almost simultaneously. He thought that the Down Tattenham train was slowing down slightly just before the second impact.

Relief Signalman Watts said that he saw from the describers that the train on platform No. 4 was for Charing Cross and he realised that he could therefore set the route and clear signal No. 10 for the parallel movement of the Down Tattenham train, and he did so. He heard Signalman Bailey make an exclamation about a train " going by " and realised that it must be the train on the Up Through line, so he at once put the lever of signal No. 10 into the " back-lock " position, which replaced the signal to red.

Signalman H. J. Floyd was on duty at Metropolitan Junction signal box. He said that after a steam train had passed, the diesel train was described to him at 2.57 p.m. by the bell code specially used for such trains, and he cleared the slot for Borough Market Junction signals No. 19 and 28 at once. The Hayes train had not been described before the diesel train.

Motorman C. F. Turpin, who was driving the Hayes train, is 60 years of age. He had been a steam engine driver before he started to drive electric trains in 1946 and he had driven the latter ever since. He had driven regularly on this route since 1955. He came on duty at 1.37 p.m. at Beckenham Junction after finishing work and getting home by 10.0 p.m. the previous day. He drove the 2.2 p.m. train from New Beckenham to Hayes and then, for the fourth day running, took over the 2.22 p.m. train from Hayes to Charing Cross.

Turpin said that the train was running well and that the trip was uneventful to London Bridge where he was received on platform line No. 4 under a yellow signal aspect, and he stopped the train about a coach length short of signal No. 23 which was red. He went to the window on the right hand side of the cab and after about two minutes he received the " right away " signal from the guard. Signal No. 23 had already changed to yellow and the route indicator showed the letter " T " for the Through line. Turpin continued *" I stepped across my cab and opened up the controls in a standing position and remained in that position until I thought I saw this yellow aspect (on signal No. 19) for me to proceed to Metropolitan Junction. As far as I can remember then I adjusted my position to sit down on the driving seat, preparing myself to stop at Metropolitan Junction having been convinced I had seen a yellow aspect for me to proceed. In this process of adjusting my position—after I had adjusted myself—I naturally looked for the points, saw they were set for my correct route and I proceeded, as I said, preparing myself to stop at Metropolitan Junction home signal"*. Turpin said that he then felt the train shudder and vibrate which gave him the impression that it was derailed, and he at once applied the brakes. He looked out of the left hand window and was amazed to see that the diesel train, which he had not seen since starting from London Bridge, had run into the side of his train.

Turpin agreed that having seen signal No. 23 at yellow he expected to find signal No. 19 at red. He said that he never exceeded a speed of 10-12 m.p.h. through Borough Market Junction and that he could easily have stopped at that signal ; he added that he had stopped at it " hundreds of times ". He was not, however, surprised when he thought he saw it at yellow because, although it may have been at red when the train started from the platform, it frequently had been cleared to yellow before it came into view. Having once seen the signal he did not keep it in view until it became obscured by the girder as he was then settling himself down. Nor did he look at it again when it reappeared beyond the girder, as he was then looking at the points. He said it was his habit to look at the points because firstly, when close to signal No. 18/19 it was difficult in some weather conditions to see its aspect on account of the way it was focussed, and to see whether the junction indicator was illuminated ; and secondly *" because margin of safety is so narrow and if by chance we had a wrong signal there is no margin to bring a train to a stand if the points are set in the wrong direction"*. He added *" normally at junctions one does look at points automatically except under conditions of darkness, of course"*.

Turpin expanded on the point about receiving a wrong signal and said that, about 18 months ago, signal No. 27 was cleared for his train instead of signal No. 28, or vice versa, but the mistake was corrected when his train was, as far as he could remember, 2-3 coach lengths from it. He did not report the matter to anybody.

I questioned Turpin closely about the aspect of signal No. 19 and he said that he may by mistake have seen the yellow aspect of signal No. 27/28 on the Up Local line. When it was pointed out that the former signal came into view before the latter he said *" Well, the only explanation I can offer to that is, I probably started my train up at reduced speed and from experience, knowing I could run at a certain speed before I approached this signal, allowing myself time to stop*

if necessary, I did not take pains to observe the signal at the first opportunity that presented itself; that is the only explanation I can offer".

Turpin stated that on the three days previous to the accident the Hayes train had been routed along the Up Local line, but he added that on previous occasions he had driven it over the Up Through line. He said that he had no worries nor anything on his mind and that he was "feeling on top of the world". He had had a fairly good night's rest and was not tired.

He had been medically examined on 12th January 1960 and was found to be fit, and his sight and colour vision were normal.

Guard W. C. Singleton was in charge of the Hayes train and was travelling in the brake compartment at the rear end of the fourth coach. He saw signal No. 23 at London Bridge was yellow and he gave the "right away" signal to the motorman; the train left at 2.57 p.m., one minute late. He looked out of the brake compartment while the train left the platform in case any late-comer had tried to board the moving train, and then recorded the departure time in his book. After that he looked into the periscope and saw that signal No. 18/19 was red; he assumed that its aspect had been clear but had changed to red when the train had occupied the track circuit ahead of the signal.

Singleton said that after leaving platform No. 4 the speed of the train was slow but even. He knew Motorman Turpin and said that he appeared quite fit when he saw him that day before the accident had occurred.

Driver A. G. Bassett had driven diesel trains for about 18 months and was driving the 1.0 p.m. Hastings to Charing Cross diesel train. He saw signal No. 35 was yellow and then, when signal No. 27 came into view, he saw it was double yellow and he opened the controller slightly. He had not seen the Hayes train on the Local line and did not realise that a collision was imminent until he had almost reached the latter signal. He then applied the brakes fully but he doubted whether they had taken effect before the impact. He said that since the accident he had taken particular notice of the speedometer reading of diesel trains passing through Borough Market Junction and thought that he could estimate fairly accurately that the speed of his train at the time of the accident was 15 m.p.h.

Driver R. T. Stone was travelling in the cab of the diesel train, and he generally confirmed Bassett's statement. He saw that the diesel train was a shade ahead of the Hayes train after passing through London Bridge station and then the electric train seemed to be overtaking the diesel train slightly.

Motorman M. Bevan was driving the 2.53 p.m. Charing Cross to Tattenham Corner train. He said that he had a green signal at Metropolitan Junction and that signal No. 10 at Borough Market Junction was double yellow. When he was 25-30 yards from it he saw a train on the Up line leaning over towards the Down line and realised that there must be a collision. The speed of his train was then about 20 m.p.h. and he applied both the brakes fully and then dived backwards into the brake compartment. He could not estimate the speed when the impact took place but thought that it had been considerably reduced. He did not see the aspect of signal No. 10 change to red.

Mr. P. Guyatt, Assistant (Eastern Area) to the Signal Engineer, Southern Region, said that he carried out exhaustive tests on the signalling equipment between 6.0 p.m. on the evening of the accident and 2.0 a.m. the following morning. The insulation resistance of the cables between the box and the signals was measured at 100 megohms between the conductors and the same figure between the conductors and earth. I asked how the test was carried out to ensure that the relay of signal No. 18/19 had not been falsely energised and he replied "*That was done by first examining all the circuiting that leads to the relay by isolating it and by testing it for insulation resistance to earth and the reading was infinity except for one wire which went up to the frame itself and that was 100 megohms. I would expect that one to be a little less*". He continued "*My general opinion was that the condition of the signalling equipment was entirely satisfactory and I could find no conditions which would give me what I was really looking for, the possibility of signals Nos. 19 and 27/28 being off simultaneously. I carried all my tests out with this mainly in view and by 2.0 a.m. in the morning I was entirely satisfied the equipment had been functioning correctly*". A subsequent investigation has established that there have been no danger side failures in the equipment during the last five years.

Conclusions

There is ample evidence that signal No. 28 was clear for the diesel train, and I am satisfied that the signalling equipment was in good order and that signals Nos. 28 and 19 could not be clear simultaneously. Motorman Turpin of the Hayes train must therefore have passed signal No. 19 when it was showing a red aspect and he must bear the full responsibility for this accident.

If signal No. 19 had been cleared for the Hayes train instead of signal No. 28 for the diesel train, it would have been possible for its lever to have been replaced in the frame before the Hayes train reached track circuit No. 12, and the route could then have been re-set and signal No. 28 cleared for the diesel train; when, however, track circuit No. 12 was occupied by the Hayes train the signal would have been approach locked and the route could not have been changed. If signal No. 19 had been cleared and then replaced to danger in this way, Turpin

could have seen it at clear during the short time (probably 6-8 seconds) which elapsed while the train was travelling the distance of 54 yards between point A and the block joint just short of point B on Figure No. 2, and if its lever had been replaced during that period he could have seen the aspect change.

Signalmen Bailey and Gore were however quite emphatic that the route was not changed in this way, and the evidence of Signalman Floyd at Metropolitan Junction supports this. I accept their statements and am satisfied that signal No. 19 was at no time cleared for the Hayes train. I think that the most likely explanation of Turpin's failure is the one which he himself offered. He said that he did not see signal No. 19 as soon as it came into view (from point A) and that, when he did look for it (probably from near point D), he may have seen signal No. 28 at yellow and mistaken it for signal No. 19; both the signals were away to the left and he could then have seen signal No. 28 ahead of the diesel train. He also said that having once seen what he thought was signal No. 19 at yellow he was proceeding towards Metropolitan Junction and looked down to see the lie of the facing points, and he did not see the signal when it came into view again.

Turpin was a good witness. I think that he must have forgotten the details of the incident which he said took place some 18 months ago and that, when he saw the aspect of the signal change to red, his train must have been considerably further away from the signal than he suggested and was not occupying the berth track circuit. He had a clear record.

Neither Driver Bassett of the diesel train nor Motorman Bevan of the Down train from Charing Cross to Tattenham Corner could have avoided this accident. Nor do I consider that Guard Singleton of the Hayes train can be blamed, although I think that, in view of the fact that a clear aspect in signal No. 19 can be seen through the periscope only momentarily, he should have looked for it before he started to book the train timings.

Remarks and Recommendations

It is difficult to understand this case of human failure because the motorman was well acquainted with the route and had previously stopped trains on a great many occasions at the signal which he passed at danger; further, he was in good health and had good sight, and was not fatigued. It is particularly difficult to understand how he could have failed to see, even momentarily, the signal when it came into view the second time at a distance of 80 yards and remained in view; it was then in full focus and more or less straight ahead. The circumstances of this accident have therefore been made known to the Medical Research Council which is assisting the British Transport Commission in an investigation into failures of this nature.

Motorman Turpin suggested that it is a normal practice of motormen to look at the lie of the points when passing through busy junctions. This is a natural action, but it should not be done to the detriment of the observance of signals, as it evidently was in this case.

Signal No. 18/19 at Borough Market Junction is not easy to adjust for the most advantageous sighting by drivers. Its beam must be focussed at a point not too far from the signal to ensure that the aspect will be seen in fog, and then, on account of the severe curvature, it is not brilliant when seen at a greater distance. I recommend, therefore, that consideration should be given to providing the signal with a wide angle lens. In view of the slow speed of trains through the junction, the small reduction in brilliance of the wider beam should not make it difficult for the signal to be seen at close range during fog.

As mentioned earlier, the overlaps beyond some signals at Borough Market Junction are very short. On account of this and of the intensity of the traffic, an overrun of a signal creates a considerable risk of a collision. I recommend, therefore, that additional detonator placers should be provided which should be made to co-act with the aspects of signals—in other words, when a signal is red the detonator placer at it should automatically place the detonators on the line and should remove the detonators when the signal is clear. Because speeds through the junction are slow this arrangement might well avoid a collision resulting from an overrun or, at the least, cause the speed of the train and consequently the severity of the collision, to be reduced.

I have said that I am satisfied that the route ahead of the Hayes train was not changed. Nevertheless, I recommend that consideration be given to extending the approach locking track circuits of the signals so as to ensure that the approach locking operates from the time that the signals come into view; this is a principle which is applied in all modern installations.

In conclusion I would say that although this accident caused vast inconvenience to a large number of persons travelling to their homes, I consider that the arrangements made by the Railway officials for dealing with the very difficult situation were commendable. The staff of all the departments concerned are also to be congratulated on their work in clearing the lines and repairing the track and the signalling so as to enable the normal passenger services to be run on the following morning.

I have the honour to be,
Sir,
Your obedient Servant,
D. McMULLEN,
Colonel

The Secretary,
Ministry of Transport

(0989) Wt. 4448—320 K8 5/60 A O S.

FIGURE 3

Scale:- 1/8 = 1'-0"

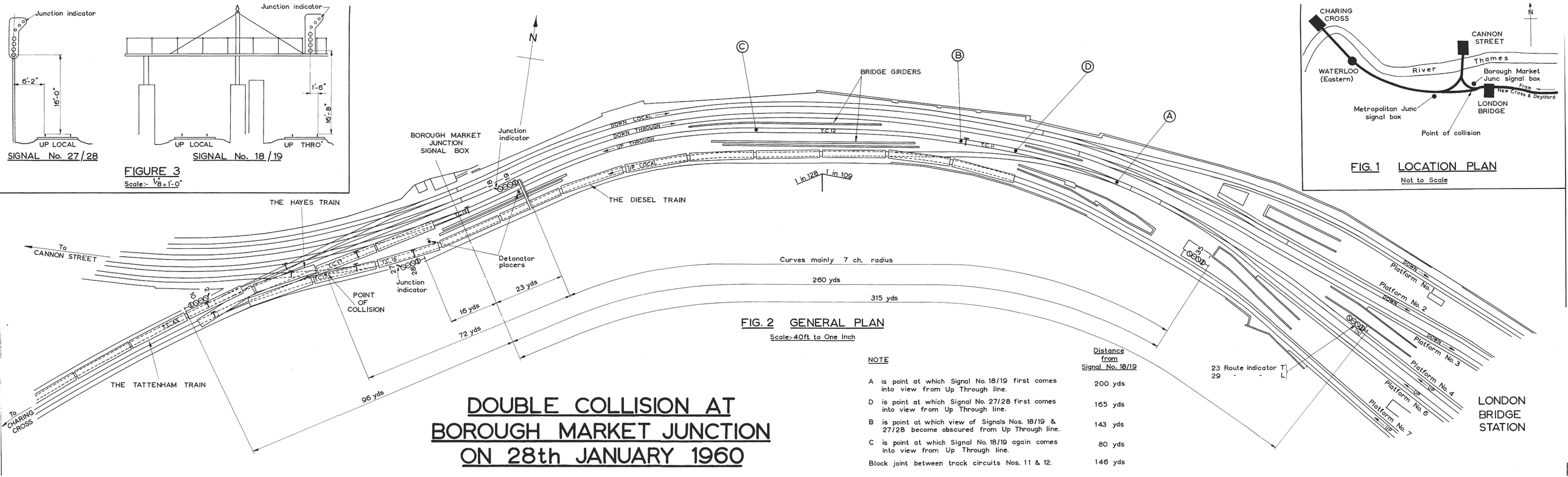

FIG. 2 GENERAL PLAN

Scale:-40ft to One Inch

NOTE

	Distance from Signal No. 18/19
A is point at which Signal No. 18/19 first comes into view from Up Through line.	200 yds
D is point at which Signal No. 27/28 first comes into view from Up Through line.	165 yds
B is point at which view of Signals Nos. 18/19 & 27/28 become obscured from Up Through line.	143 yds
C is point at which Signal No. 18/19 again comes into view from Up Through line.	80 yds
Block joint between track circuits Nos. 11 & 12.	146 yds

FIG. 1 LOCATION PLAN

Not to Scale

DOUBLE COLLISION AT BOROUGH MARKET JUNCTION ON 28th JANUARY 1960