

SOUTHERN RAILWAY.

MINISTRY OF TRANSPORT,

7, Whitehall Gardens,

London, S.W.1.

18th May, 1937.

SIR,

I have the honour to report for the information of the Minister of Transport, in accordance with the Order of the 2nd April, 1937, the result of my Inquiry, at which I was assisted by Major G. R. S. Wilson, into the circumstances attending the accident which occurred soon after 8.2 a.m. on the 2nd April, at Battersea Park, on the Central Section of the Southern Railway.

In compliance with the Appointment of the 17th April, I also acted on the 20th April as Assessor to the Coroner at the Inquest, and my Report thereon is attached as Appendix I.

The 7.31 a.m. electric passenger train, Coulsdon North to Victoria (due Victoria at 8.6 a.m. via Selhurst and Clapham Junction), running on the up local line, overtook and came into violent collision with the rear of the 7.30 a.m. electric passenger train, London Bridge to Victoria (due 8.3½ a.m. via Tulse Hill and Clapham Junction), which was about to re-start, after being detained at Battersea Park up local home signal.

The Coulsdon train entered the section at Pouparts Junction under clear signals at a speed of about 40 m.p.h., and it was estimated to have been travelling at 30 to 35 m.p.h. at the moment of impact. The leading (motor) coach mounted and telescoped the body of the rear (motor) coach of the London Bridge train, and fell over to the right on to the down local line. Fortunately, the accident occurred before the height of the peak period, and it is assumed that there were in all some 350 to 400 passengers in the two trains, in the proportion of roughly 1 to 2½, the loading, as usual, being heavier in front than in rear. Seating capacity was 652 and 662 respectively.

I regret to report that six passengers, and Guard H. W. J. Brooker of the London Bridge train, sustained fatal injuries, while three more passengers died in hospital within two days. Of these nine passengers, two were employees of the Company, one of them travelling on duty. Seven passengers were also seriously injured, and ten others, as well as Motorman A. Anthony and Guard R. W. Adamson of the Coulsdon train, were taken to hospital. In addition, 62 other passengers complained at the time, or subsequently, of minor injuries and shock.

As the result of short circuit, removal of power from the up and down local lines was immediate; the breakers opened at once at Victoria and Clapham Junction sub-stations, and though there was a flash, a buffer becoming welded to the conductor rail, there was no fire. With regard to the down main, which was obstructed, fortunately the motorman of the 8.0 a.m., Victoria to Brighton, train, was able to stop clear of the site, when he noticed hand signals from the motorman of the London Bridge train; by using his short circuiting bar, he rendered that line dead within two minutes of the collision, and the up main was dealt with by the sub-station attendant on receiving information by telephone.

The relief work appears to have been very efficiently carried out, the Metropolitan Police, Fire Brigade, and doctors rendering every assistance to the Company's staff. The first ambulance arrived at 8.10 a.m.; first aid men commenced to arrive at 8.15 a.m., followed at 8.20 a.m. by doctors, police tenders, &c., after which the removal to hospital of the injured persons commenced. The last case of shock left at about 10.20 a.m.

Traffic to and from Victoria (Central Section) was suspended until 4.45 p.m., by which time all tracks were cleared; main line electric services were diverted to London Bridge between 8.20 a.m. and that time, while the steam services were similarly diverted up to 11.0 a.m., when arrangements were made to operate them over goods lines via Pouparts Junction and Stewarts Lane. Suburban services terminated at Clapham Junction and other stations, with some diversion

to London Bridge, and the South London service was only suspended between 8.0 a.m. and 10.0 a.m. The emergency arrangements, which were thus made for handling traffic, reflected credit on all concerned.

The London Bridge train comprised two 3-coach motor units (with a driving cab at each end), with two trailers in the centre, eight bogie coaches in all, of compartment type, weighing 263 tons unloaded, and 501 feet in length overall. The Coulsdon train was of the same formation; it weighed 258 tons and measured 503 feet. Both were fitted with the Westinghouse brake, operating blocks on all wheels.

Visibility was poor, and there was drizzling rain.

Effects of the Collision, Damage, &c.

Only one sleeper was damaged, the conductor rail was pushed over, a few insulators broken, and a rail slightly burned by short circuit. There was no damage to signalling equipment.

The bodies of the vehicles (converted steam stock) were of timber construction throughout, except the motorman's and guard's compartments of the motor coaches, which were steel panelled with steel roofs (S.W.G. 18), the motorman's compartment being also steel lined. The framing was of hardwood throughout, and the panelling of the passenger portion of mahogany. The underframes were of steel. At the motor ends, there were the usual side buffers, and, elsewhere, central self-contained buffers were mounted on the underframes.

With regard to the effects of the collision on the rolling stock of the London Bridge train, the body of the rear coach was destroyed; the floor was swept clean by the overriding front coach of the Coulsdon train, which, before overturning, penetrated as far as the leading compartment but one. The rear end of the underframe, headstock, and buffers were buckled downwards, which facilitated the overriding. Nine of the 10 fatalities occurred in this vehicle. There was no derailment, and the coaches ahead were undamaged, no windows even being broken.

The front portion of the body of the leading (motor) coach of the Coulsdon train was destroyed, viz. the motorman's cab and the first two compartments; the remaining compartments suffered less. Its bogies, which were considerably damaged, were arrested by the buckled frame of the rear coach of the London Bridge train, and were thus forced under the frame of the second coach, the leading bogie of which was also similarly arrested and became separated from its centre by a distance of about 13 feet. Only one pair of wheels (the trailing bogie of the first coach) was slightly lifted; otherwise there was no derailment. While the leading end of the second coach was a little damaged and the buffer case in rear was split, no windows were broken; with regard to the rest of the train, only one side buffer casting was affected.

The shock of the collision was absorbed by the trailing and leading coaches of the London Bridge and Coulsdon trains respectively. The evidence was that the brakes were in full operation on the latter; they had just been released on the former, but power had not been applied. The London Bridge train was thrust forward 15 to 20 feet; it was standing on a rising gradient of 1 in 120. The Chief Mechanical Engineer expressed the opinion that had the bodies of these two coaches afforded greater resistance, as, for example, of all-steel construction, the increased rigidity might have resulted in derailment and the throwing about of the coaches in star formation. It was fortunate that this did not happen, as the collision took place on a viaduct.

Description.

The site was on the approach to Longhedge Bridge (1 mile 47 chains from Victoria), which carries the Company's Central Section (Victoria) main line of four tracks over the Western Section main line approaching Waterloo. From east to west the lines are designated down local, up local, down main, and up main.

After leaving Clapham Junction, the up lines rise in an easterly direction past Pouparts Junction, traverse reverse curvature, and thereafter curve northwards on the approach to the bridge and through Battersea Park Station; at the north end of the station, the South London line joins the local lines. The next box north of Battersea Park is Battersea Pier "A," 534 yards distant.

The up local, at the site of the collision, is on a left-hand curve of 25 chains radius, rising at a gradient of 1 in 120. The general layout of the lines and of South London Junction, and the positions of relevant boxes, signals, &c., are shown on the attached plan, Appendix II.

The system of signalling in use on this section of line is Sykes lock and block, a brief description of which, prepared by Lieut.-Colonel G. L. Hall, the Company's Assistant Engineer (Signals and Telegraphs) is attached as Appendix III. This description applies generally to all such apparatus, and in particular to Pouparts Junction manual frame; certain other features, however, also apply to the installations concerned in this case.

Battersea Park, the box towards which the trains in question were travelling, 1,474 yards from Pouparts Junction, is the outermost of a group of electro-mechanical equipments, which were installed between this point and Victoria about 30 years ago. In these boxes (which include Battersea Pier "A," Grosvenor Road "A," and Victoria North and South) the signals are motor operated and controlled by slides in the frame, mechanically interlocked with manually operated points. The system of rotation locking and plunging for release is essentially the same as in the case of other Sykes equipment. The cancelling apparatus, however, which consists of keys in the mechanical Sykes frames, consists in these electro-mechanical frames of push-buttons above the signal slides. When the plunger at these boxes is actuated, a label with the words "Train On" is shown on the window above the plunger concerned, and this indication remains until the appropriate signals have been worked and the release treadles operated, *or until the cancelling button has been used.*

A drawing showing the layout of the frame, instruments, plungers, release buttons, &c., at Battersea Park is attached as Appendix IV. There are 14 working point levers with 9 spare, and 32 working signal slides with 19 spare. Trains are described on Walker type Transmitters and Receivers.

In addition to the normal Sykes features, a "Train-Waiting" treadle of the rail depression type is installed 130 yards in rear of the up local home signal. This treadle, when depressed, causes a bell to ring in the signal box, but there is no such indication of the presence of a train standing at the signal if a wheel is not depressing the treadle.

With reference to Appendix III, at other Sykes boxes on the Central Section, where the block indicator stands normally lowered, the switch-hook is not used in the ordinary sequence of block operations. The circuits are such that the block indicator at the box in rear is raised by the acceptance plunge from the box in advance, and is lowered again by the pulling and replacing of the signal ahead of the home of the latter box; in such cases, therefore, the block indicator is not lowered by this means until the signalman at the box in advance is satisfied that the train has passed the clearance point, and that he can properly send the *Out-of-Section* bell signal.

At Battersea Park, however, the circumstances in this respect are exceptional: on the up local line, the lowering of the indicator at Pouparts Junction is effected by the use of the home signal (No. 67), which (with its backlock releasing treadle) is the first signal of this box and is a considerable distance in rear of it; if the switch-hook, with its over-riding control on the block indicator, is not applied (and the home signal is promptly returned to danger), the block indicator will be lowered before the train has passed the clearance point, which in this case is the starting signal (No. 66) in advance of the box.

To ensure, therefore, that the block indicator at Pouparts Junction is maintained in the raised position (so precluding, by regulation, the offer of a following train) until the preceding train has passed the clearing point, and the *Out-of-Section* signal has been transmitted, the regular use of the switch-hook at Battersea Park is imperative. For this reason, it is the recognised custom at Battersea Park, although not made the subject of official instruction, to apply the switch-hook directly an acceptance plunge has been given, or when the *Entering-Section* signal is received, and to keep it applied until the train has passed the starter.

To obtain a release of the backlock of the starters at Battersea Park, should the relevant treadle not be operated, or fail, it is necessary for a push button at Battersea Pier "A" box to be depressed simultaneously with the use by the Battersea Park signalman of the button marked A. (The letters A, B, C, are not actually on the case containing the buttons, but are used herein for reference.)

Similarly, should any of the up home signals have been pulled and not freed again by use of the relevant starting signal, the frontlock on the home signal can only be released, with the co-operation of the Battersea Pier "A" signalman, by using the same button A. Bell codes are in use to request, and indicate the giving of, the various releases, and switches are provided at Battersea Park box which have to be set in the proper position so that the release shall be received on the desired signal.

Should the up plunger to Pouparts Junction have been used for the acceptance of a train and the lower tablet show "Train-On" (the plunger then becoming locked), the Blank indication can be restored and the plunger freed by depression of button B, so far as the up local line is concerned, provided the up home signal is at Danger; the co-operation of the Pouparts Junction signalman is not required.

With regard to the cancelling apparatus, an extract from the Special Instructions to signalmen at Battersea Park, dated June, 1932, was as follows:—

"In the event of the special cancelling apparatus failing, the Signalman must break the seal of the instrument case and move the slides in order to restore the instrument and lever to the normal position, immediately calling the Lineman to put the instrument in order and re-seal the case. The failure must be reported in due course."

Report.

i. Including the two trains involved in the collision, the following are those which were in the vicinity, or were being dealt with at Battersea Park, at about the time of the accident; the trains are tabulated in Appendix V:—

- (a) The 7.54 a.m. down electric passenger train, Victoria to Beckenham, passed on the down local at 7.57 a.m., at booked time.
 - (b) A light engine, Stewarts Lane to Victoria, left Battersea Park at 7.58 a.m. on the up main.
 - (c) The 7.56 a.m. down electric passenger train, Victoria to Epsom, passed on the down main at 7.59 a.m. at booked time.
 - (d) The 7.37 a.m. up electric passenger train, London Bridge to Victoria, via the South London line (called the "South London train"), was due to arrive at 7.57½ a.m. and depart at 7.58 a.m. It was held, however, at the South London home signal, No. 64, from about 7.58½ a.m. till 8.0½ a.m., after which it arrived and went forward at about 8.1½ a.m. It was booked to precede the *London Bridge train* on the up local.
 - (e) The *London Bridge train* was due to arrive at 8.0½ a.m.; it actually arrived at the up local home signal, No. 67, at about 7.59½ a.m., where it stood till soon after 8.2 a.m. when the collision occurred.
 - (f) The 7.58 a.m. down electric passenger train, Victoria to Epsom Downs (called the "Epsom Downs train"), was due to pass on the down local at 8.1 a.m., but, owing to the delay to (d), it stopped at the down home signal at that time, and, after starting forward, was brought to a stand over the junction, as the result of loss of power when the collision occurred.
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- (g) The *Coulsdon train* was booked to pass at 8.3 a.m. on the up local; after stopping at Clapham Junction, it passed Pouparts Junction at about 8.1½ a.m.
 - (h) The 8.0 a.m. electric passenger train, Victoria to Brighton (the "Brighton train"), due to pass at about 8.2½ a.m. on the down main, was stopped, as already described, at about 8.3 a.m., between Battersea Park and the site of the accident.
 - (j) The 8.0 a.m. electric passenger train, Victoria to West Croydon, due to pass at 8.3 a.m. on the down local, was stopped at Battersea Pier "A" at about 8.2 a.m.
 - (k) The 6.10 a.m. steam passenger train, Tonbridge to Victoria (the "Tonbridge train"), due to pass at 8.4 a.m. on the up main, was stopped at Pouparts Junction at 8.6 a.m.

Briefly, the facts are that soon after the passage of train (a) at 7.57 a.m., the signalman attempted to lower signal No. 64 for train (d) before completing the re-setting of the junction, viz. with points No. 5 normal instead of reversed. Signal slide No. 64 became front-locked, even after point lever No. 5 had been pulled, and, in consequence, he had to take steps to free the slide. This took some time, and train (d) was delayed at signal No. 64 from about 7.58½ a.m. till 8.0½ a.m., during which time train (e) arrived at signal No. 67 at about 7.59½ a.m. On the release of signal No. 64, train (d) drew into the station and departed at 8.1½ a.m., while train (f) arrived at the down local home signal at 8.1 a.m. The junction was re-set again, and train (f) then started forward; in the meantime, however, in the process of releasing signal slide No. 64, the acceptance of train (e) was "cancelled," and its presence was overlooked. The following train (g) was thereafter permitted to enter the section under clear signals, and it collided with the rear of train (e) just as signal No. 67 had been lowered.

2. It will be observed that five trains and a light engine passed the station, or arrived at the home signals, in four minutes, 7.57 a.m. to 8.1 a.m. inclusive; further, that a train was due to pass on each of the four lines in the minute 8.3 a.m. to 8.4 a.m. inclusive. This is a total of 10 movements in the seven minutes, 7.57 a.m. to 8.4 a.m. inclusive.

The electrification to Brighton and West Worthing was opened in January, 1933, and to Eastbourne in July, 1935; the total number of trains signalled at Battersea Park on weekdays has increased from 712 in 1932 to 838 this year, viz. by 17½ per cent. in the last five years. In this time the number of trains during the morning peak hour, 8.30 a.m. to 9.30 a.m., has increased from 54 to 61, and during the evening peak, 5.30 p.m. to 6.30 p.m., from 57 to 65.

With regard to the signalman's operations at Battersea Park, each train necessitates five bell signals; in addition, there is a "plunge" for each, and two movements of the switch-hook. For each up train, there are also three signal slides to pull and reverse, making up a total of 14 operations in the up direction, while the corresponding total in the down direction is 16 operations. At a maximum, therefore, in the evening peak hour this year, the signalman performs 972 operations, apart from the use of the train describers and telephones, and the movement of point and bolt levers for the setting and resetting of the South London Junction, over which there is a 20-minute service in each direction.

Battersea Park is the last converging junction for up trains before reaching Victoria. Platform working at Victoria therefore depends on correct use of the Battersea Park train describers. Booking of trains was carried out at this box until 1932, when it was discontinued and the booking lad removed.

Evidence.

3. Motorman C. R. Horsefield and Guard F. W. Kemp were in charge of the South London train, which was running a couple of minutes late. Their estimate was that the train was held at signal No. 64 for about two minutes, after which it drew into the station, by which time (about 8.1 a.m.) the Epsom Downs train had arrived at the down local home signal. This wait is not an infrequent occurrence, in view of the traffic on the local lines. Neither of them observed the London Bridge train, which had arrived in the meantime and was also waiting at No. 67 home signal. Although power failed after passing Battersea Pier "A," the train was able to coast into Victoria.

4. Motorman J. F. Spiers, of the London Bridge train, said that after leaving Clapham Junction, the Pouparts Junction up local distant was at Caution, the train was checked at the Pouparts Junction home, and came to a stand at Battersea Park home No. 67. He judged the time by the blowing of factory hooters as about 7.59½ a.m. He estimated that he waited about two minutes, but he did not think three minutes, after the hooters blew. (Consideration of the times recorded by the sub-stations of the short circuits shows that the collision took place a little before 8.2½ a.m.) He said that he was watching the signal and that immediately after it fell the collision occurred; he had released the brakes, but had not applied power. He was seated at the time and was knocked backwards, the train being pushed forward 15 to 20 feet. The evidence of the trainmen of the Coulsdon train indicates that this signal was in its lowered

position when they sighted it, and, though no criticism attaches to him, it appears that if Spiers had acted a few seconds earlier, in which case his train would have been moving forward, the effects of the collision would not have been so serious.

5. Motorman A. Anthony of the Coulsdon train, after injury and severe shock, was able to give evidence at the Inquest on the 20th April and at my resumed Inquiry on the 23rd April. He said that visibility was hindered by drizzle. After leaving Clapham Junction, the Pouparts Junction distant was passed at caution; the outer and inner homes, Nos. 8 and 18, were clear. When the starter, No. 19, came into sight, it was also clear, the controller then being opened out, and the signal passed at about 40 m.p.h., the Battersea Park up local distant under it being at caution. Thereafter, power was shut off and Anthony was allowing the train to coast (up the gradient) under sufficient control to stop at Battersea Park home, No. 67, which, however, he observed in the clear position as he came round the bend. When he subsequently noticed the London Bridge train ahead, at a range of perhaps *"two or three train lengths"* (there being a white blank sheet of glass instead of a head code), he was under the impression that it was an empty train coming towards him on the down main (on his left, the line curving to the left as he approached). This is the regular route for empty trains going to Selhurst for repairs.

His account was that *"almost simultaneously"* he realised it was a train ahead on the same line, and he made an emergency application of the brake. He was standing up; he could not recall how he got out of the cab. He did not open the door and jump; he had no idea as to his position when he made his emergency brake application, which he thought caused skidding. The state of the rail would have tended to this, and skid marks were subsequently observed on the top of the rail for 40 feet in rear of the site; there was, however, no trace of flats on any of the wheels.

It takes normally about three seconds for an emergency brake application to operate fully on the rear of an 8-coach train, and, having regard to the effects of the collision, it is considered that Anthony's application cannot have been made at a distance greatly exceeding three coach lengths, say, 50 yards. Had he realised the situation a few seconds earlier, when he first saw the train ahead, Anthony thought that he would have been able to have reduced speed considerably before the collision occurred.

Guard R. W. Adamson generally confirmed Anthony's evidence with regard to visibility and to the running of the train. He looked out of his van first on one side and then on the other, and after observing that the Battersea Park home, No. 67, was clear, he picked up his train book and was making an entry when the collision occurred. He felt the brake application before the impact.

6. Signalman C. H. Henrick, of Longhedge box (near the site but at the lower level), saw the collision occur; but he did not observe the position of signals. The Coulsdon train was only two or three coaches away, when he happened to notice it and realised the position. He estimated its speed at less than 40 m.p.h. He saw the flash of the short circuit when the collision occurred. He immediately telephoned to Stewarts Lane box for assistance and ambulances, asked Clapham "A" to get into touch with Waterloo, and told Relief Signalman T. G. P. Hillman of Pouparts Junction what had happened. He stated that *"Hillman was very surprised on the first occasion when I rang him up, and as far as I can remember he rang me up and spoke to me a second time, when I repeated my message."*

7. Signalman T. W. Truelove, of Battersea Pier "A," referred to the fact that he received from Battersea Park (where he had realised that a stranger, Relief Signalman G. F. Childs, was on duty), the bell signal for a backlock release in respect of the up local. He depressed his relevant button, but received no bell signal to intimate that the release had been obtained; in view of this, he assumed that, though asked for, the release could not have been wanted. It was not his duty to inquire the reason, and it did not occur to him to do so. He did not know in what circumstances the release was wanted, nor its function if it had been obtained; this may have happened before, but it was unusual. He was quite certain that there was no confusion as to the line on which the release was required, and that he depressed his corresponding up local button. As to the use made of this releasing apparatus generally, Truelove stated that *"it may be*

used on one day several times and then not for several days. It simply takes the place of a release key, I understand." He had served at Battersea Pier "A" for nine years, and said that failures of treadles and instruments were not frequent.

8. Relief Signalman T. G. P. Hillman was in charge of Pouparts Junction; he is 45 years of age and had served for 16 years in his present capacity. He had worked in this box on and off for several years, and for about seven weeks on the present occasion. He had also worked for several weeks in Battersea Park some three years ago, and was confident of being able to do so again. He was a good witness, and is evidently a keen alert man; his evidence was that everything was working satisfactorily, both as regards signalling apparatus and traffic, until the accident happened. No train register is kept at Pouparts Junction. His account was as follows:—

"The 7.30 a.m. London Bridge to Victoria was signalled in the usual manner on the up local line, and immediately after giving the 'Train-out-of-Section' signal to Clapham Junction 'B' box I was offered, and at once accepted, the 7.31 a.m. ex Coulsdon North on the up local line. I was waiting for the 'Train-out-of-Section' signal for the 7.30 a.m. ex London Bridge from Battersea Park. At this time I had accepted the 7.58 a.m. ex Victoria on the down local, the 8.0 a.m. ex Victoria on the down main, and the 6.10 a.m. ex Tonbridge on the up main. I was about to offer the 7.31 a.m. ex Coulsdon to Battersea Park when the up local block indicator went to 'Line-Clear.' I immediately offered the 7.31 a.m. ex Coulsdon to Battersea Park, and this was accepted immediately, and at the same time I went to the up main line bell and offered on the 6.10 a.m. ex Tonbridge on the up main line, but this was not accepted. I thought this was unusual as the train is rarely held. As soon as I received 'Line-Clear' for the Coulsdon train I lowered the outer and inner home signals, also the up local starting signal. I then waited for 'Line-Clear' for the Tonbridge train. Upon receiving the 'Line-Clear' I pulled off for the 6.10 a.m. ex Tonbridge. At about 8.7 a.m. the telephone rang and Longhedge asked me to get all available assistance. I could not understand this and called him again to repeat it. He said there was a collision on the South Western bridge and I immediately called Clapham Junction and Victoria. I heard nothing more after replacing my signals to 'danger' in front of the Tonbridge train."

Hillman judged that the Coulsdon train passed him at 40 m.p.h., viz. normal speed, 1 to 1½ minutes after the starter had been lowered; he observed the signal respond to the lever, and he was sure that the Battersea Park inner distant, under it, remained at caution. He was quite certain that all his signalling duties were properly carried out, and he received the *Out-of-Section* bell signal for the London Bridge train before he offered forward the Coulsdon train. He thought that the London Bridge train was held at Battersea Park home signal, as is not unusual, for about a minute before he received the *Out-of-Section* signal; his offer of the Coulsdon train was immediate, while the acceptance bell signal and the release of the Sykes instrument followed at once. He emphatically stated that he would not have lowered the starter for the latter without acceptance by bell signal.

He considered that there was no possibility of his having confused the *Entering-Section* bell signal for the Epsom Downs train with the *Out-of-Section* signal for the London Bridge train; the following extract from his evidence is noteworthy:—

"Q.—Supposing you had not received the 'Train-out-of-Section' signal for the 7.30 a.m.?—A. I should have waited about two minutes and then called up the box in advance and asked if the previous train had arrived."

"Q.—Do the regulations allow you to offer forward the 'Is-Line-Clear' 3-1 when your block indicator is in a raised position?—A. No, it must be clear."

"Q.—Are you absolutely certain you got 2-1 on the bell at the same time as your block indicator dropped after the 7.30 a.m.?—A. Yes, I am absolutely certain."

"Q.—Have you ever known instances where you have been working with Battersea Park and the indicator has dropped without getting the 2-1 on the bell?—A. I cannot recollect this, but as a practical signalman it would not strike me as very irregular if I did.

"Q.—On this occasion it is only your memory on which you are dependent to say you got the block bells?—A. Yes, but I am absolutely certain.

"Q.—Supposing you had not received this 'Out-of-Section,' you would still have offered the train?—A. No, I should have called him up on the telephone.

"Q.—When did you last fail to get an 'Out-of-Section' during the last seven weeks you have been at Pouparts Junction?—A. I cannot think of one during that time, and it is such a rare thing I should ring up at once.

"Q.—Supposing you saw the block indicator fall and you did not hear the bell, you would not hesitate to offer a train forward?—A. I should immediately call up and ask if he meant it for the 'Out-of-Section.' I am quite certain I would not offer a train forward without receiving the block bells in addition to the indicator falling."

Hillman said that the delay to the Tonbridge train made him think that a strange man was working at Battersea Park, as two main line trains had also been held previously; possibly the delay on this occasion was due to the operation of the light engine at 7.58 a.m. He had never experienced a false-clear failure on the up local Sykes instrument; had there been one he would have noticed it. His statement was that "*the arm went up with the usual click and the 'free' tablet dropped down in the normal manner. I am quite sure I got the 'clear' for the up main at practically the same time as I got the 'clear' for the Coulsdon; the Coulsdon was a little before the main line train. The Tonbridge had not left Clapham Junction when I pulled off my signals for it. . . . I do not remember ever having forgotten to replace the starting signal, and if I did the home signal would be locked and could only be freed by using the key. I have never used the key except for a treadle failure or for cancellation of a train. . . . I last used the key on No. 18 for a treadle failure about three weeks previous to the accident.*"

With regard to Hillman's general and long experience of the Victoria district, and of these two boxes, he considered that the use of the switch-hook at Battersea Park was "*absolutely essential*," though not so at Pouparts Junction.

9. This was Relief Signalman Childs' first day in charge of Battersea Park, and he had been on duty two hours. He is 40 years of age and was in the special (or highest) grade; he had served in his present capacity for the last 14 years, and had been passed as fit to operate no less than 60 boxes. On the 25th, 26th, 28th, 29th and 30th March he had worked at Victoria "A" box; on the 27th he had acted as foreman at Forest Hill; on the 31st he worked Battersea Yard, and on the 1st April Stewarts Lane. The last-named is a very busy goods yard box, and it was also his first day there in charge, following five or six weeks recent training. His duty had lasted from 9.0 a.m. till 2.0 p.m., and he had therefore had 16 hours' rest when he took over Battersea Park.

Childs stated that he was in good health and felt fully confident in taking over. He had been under training previously on 17 days of seven hours each, five in December last, three in February, and nine in March. He had been examined on the 24th March (the last day's training having been on the 15th March) by Area Inspector Matcham, whose certificate of that date found him "*capable to take charge of this box.*" His last previous experience of the electro-mechanical Sykes system was when he worked in Grosvenor Road for a period of some three weeks, two or three years ago. Childs said that his examination consisted of working the frame for 45 to 50 minutes between 10.0 a.m. and 11.0 a.m., viz. *after the peak traffic*, while Inspector Matcham "*watched me the whole of the time, and I had no discussions, no questions or answers.*" Nothing unusual happened; he was not specifically tested with regard to the operation of the releasing buttons, and did not have to use them, but he was asked if he was confident in his knowledge in this respect.

Extracts from Childs' first statement to the Company's officers on the day of the accident are as follows:—

"I had a failure on the South London instrument at about 7.58 a.m. or 7.59 a.m.—the instrument became locked. I caused this by trying to pull my signals (No. 64) before the points were correctly set. I then pulled No. 5 points and asked for a backlock release from Battersea Pier 'A' and he gave it to me, but I was unable to get the release. I then released myself by putting my arm in the frame and releasing the Sykes instrument. I pulled off for a down Epsom Downs train and the 7.30 a.m. ex London Bridge up. The up Epsom Downs train came to a stand and I naturally thought the current had gone off and told the foreman. I saw two or three flashes but heard nothing of the collision. I have never asked for the release and not got it whilst I have been learning Battersea Park box. . . . I have thought the matter over, and all I can think of as to the cause is that I might have lifted the 'Train-on-' ticket with my elbow when I put my hand in the case, and in putting the case on I might have pushed the plunger in with my body. I cannot think of any other way it could have happened. I do not remember taking the switch-hook off the Up Local plunger. When I tried to get the release I pushed the same button as I did when the subsequent test was made. I had the Tonbridge train offered on the up main at about the same time as the local train. I held this about a minute. I did not get the Coulsdon offered to me on the Up Local at all. I had worked this particular turn when learning and knew the running of all the trains."

Extracts from Childs' further statement to the Company's officers on the 3rd April are as follows:—

"I had not thought of giving the London Bridge preference over the South London. I have known preference to be given to the London Bridge, but yesterday morning I had no intention of altering my usual procedure. I have no trouble on my mind at all. It did not occur to me to flag the train forward; I should have had to walk a long distance to do this. I have had no occasion to use the release circuit to 64 or 67, but have used No. 70. I have had a good many years with the buttons and am quite familiar with them. They all work on the same principle. I knew exactly which lock to go for when I put my hand in the frame to release; there is the possibility of my having accidentally moved a 'Train-On' ticket when I put my arm in the frame. The 'Train-Waiting' bell rang while the train was standing at the home signal and the bell stopped after I pulled off. I put the home signal back at about 9.0 a.m."

Extracts from Childs' further statement to the Company's officers on the 5th April are as follows:—

"I am perfectly sure the switch-hook was on when I pulled the home signal, but not quite sure I put it on when receiving the 'In-Section.' If I do not put the switch-hook on when I receive the 'In-Section' signal, I always put it on when I pull the home signal. The Epsom Downs train was just about starting from the home signal when the accident happened. When I received the 'Train-entering-Section' signal (judged to have been at 7.58½ a.m.) for the London Bridge train I was endeavouring to free the lock on the South London home signal, and after two or three minutes a stranger, with S.R. on his collar, came to the box and said there had been an accident with two trains. I did not realise what trains he could mean. I knew the London Bridge was at the home signal but had no information as to what the second train was. . . . I normally give 'Out-of-Section' for a train when it passes the starting signal."

The foregoing evidence contradicts that of Signelman Hillman, and Childs maintained it throughout my Inquiry. He then referred for the first time to an unusual incident which occurred at 6.5 a.m. and which he said he thought was a "treadle failure" on the up main, after the passage of a boat train. He rectified matters by setting certain points in connection with the up carriage road and by operating a release button which did not require the co-operation of Battersea Pier "A." He stated that the same treadle had failed once before when he was learning the box, and the signelman had advised him of this method of release; but, as the result of the consideration given to his account (in which Signelman Harvey, who is permanently employed in the box, was questioned—see later),

it appears that Childs' own mistake brought about the hitch, viz. the operation of the home and starting signals on the up main in the wrong order.

After the passage of the 7.54 a.m. down train, Victoria to Beckenham, at 7.57 a.m., he also made another mistake in omitting to set the junction for the South London train, viz. he did not pull lever No. 5 after putting back No. 4. His attempt to pull No. 64 signal slide in such circumstances, to admit the latter train to the platform, naturally failed, and the slide became locked by the operation of the Sykes lock, which fell into the notch in the locking piece and prevented the slide moving forwards. He had operated the junction correctly a number of times that morning, and could not explain this mistake, except that he was in a hurry, which no doubt he was, having regard to the movements already described.

After careful consideration, I am satisfied that no criticism as to maintenance arises with regard to the locking of signal slide No. 64, in the circumstances referred to, though such a hindrance to operation could not arise on a modern power frame. The remedy, however, was simple; viz. the release (after setting points No. 5) which Childs sought in conjunction with Truelove, but failed to obtain. This is an important feature in the case; he realised that he was delaying the South London train, and no doubt the London Bridge and Epsom Downs trains were also on his mind. He said that though he was hurried he did not feel agitated or worried, and knew what he was doing and what he wanted to do, viz. the release of slide No. 64.

With regard to Childs' statement that he endeavoured to obtain this release by pushing the same button as he did when subsequently demonstrating his actions, Colonel Hall's statement briefly explains what happened:—

"When I got into the box after the accident I asked him (Childs) to do the same thing as he had done before. He pushed the button and he did not get the release. I quite quickly afterwards left the box. When I came back and the regular signalman had come on, I think it was Harvey, I said to him 'Now, after you have pulled 64 with 5 normal, will you tie yourself up?—Yes'. I asked him to do this. He gave the bell signal to Battersea Pier and pushed two buttons, one of which was different from the one that Childs pushed, and got the release at once. I therefore realised that Childs, in demonstrating to me, had pushed the wrong button. Actually the right and the wrong are next door to each other (viz. A and C respectively) . . . I have no definite proof of what Childs did at the time of the accident. The only thing I know is that when Childs showed me at 10 o'clock what he said he did, he did not push the right button."

With regard to Childs' subsequent action in cutting the seals when he failed to obtain the release, he stated:—

"As I was unable to get the 'free,' I immediately went to the seals and cut them with a knife and opened the case; I lifted the top with my right hand, then pulled the front forward with my left hand, or vice versa. I lifted the top and pulled out the front to an angle, and then put my hand over the top to release the lock of 64 signal. I was unable to reach it. It was too high, and I was unable to get to the bottom of the shelf. I was unable to do that, so I pulled 63, the South London starter, and then lifted the front out altogether, and I was then able to release 64 . . . I operated 63 as a safeguard . . . The next instrument to it was the one I wanted. I then pulled over 64 slide . . . It (the South London train) had then been standing there a minute or two. I realised I was delaying the train . . . The train then arrived at the station. I put back 64, and, after the train had passed my local starting treadle, I returned 63 . . . After pulling 63 with my right hand, I pushed the spring lock on 64, and with my right hand I was then able to pull 64 slide. During that time I had the front of the case under my left arm. I immediately replaced the front and the top fell down by itself . . . There is an instruction to the effect that if there is a failure you are justified in releasing."

None of the permanent signalmen had suggested this method to Childs; he evidently acted on the spur of the moment. His reason was that "the time was going," and he neither rang up Battersea Pier "A" for advice, nor did

he send for a lineman, as he had "*done this once before at Grosvenor Road for a similar failure (two or three years ago), Victoria South being unable to release me.*" He also said that he had seen it done when he served as a box boy at Grosvenor Road.

Though the Special Instructions were not new to him, he did not apparently understand their purport at the time; he had not read them since he served at Grosvenor Road, nor had he been instructed on the subject. He stated, however, in cross-examination, that had he thought he was disobeying an instruction he would have hesitated to act as he did, and would have had the South London train flagged through the station, in which event the "failure" would have corrected itself, and he would have been able to return slide No. 64 fully to normal. In fact, his account was that he thought he was acting quite properly, and his sole object was to prevent delay. No such thing had occurred while he was under training, nor releasing of any kind, and he admitted that had one of the permanent signalmen been present he would not have acted as he did.

With regard to Childs' knowledge of the presence of the London Bridge train, he said he accepted it two or three minutes before the South London train came to a stand at No. 64 signal, the previous train on the up local having been the 7.29 a.m. ex Beckenham, which passed Battersea Park at 7.56 a.m. He said he was aware that the London Bridge train had arrived at No. 67 signal while the South London train was waiting at No. 64. He contradicted Hillman's evidence that he had transmitted the *Out-of-Section* signal for the train by saying that he heard the *Train-Waiting* bell ringing. As, however, this bell could only ring continuously by a wheel coming to a stand on the actuating treadle, it is by no means certain that Childs' statement in this respect can be relied upon. On the other hand, there seems to have been the possibility of genuine misunderstanding in this respect on Hillman's part; for example, Childs' bell signal offering the Epsom Downs train on the down local might have been transmitted (and misread) immediately before the release of the plunger when the case was open.

Childs' evidence amounted to admission to having operated inadvertently and without knowledge (a) the cancelling button, which released the plunger and lowered the block indicator at Pouparts (if the switch-hook was not applied), and (b) the plunger itself, which released the Pouparts starter No. 19. I think the possibility of (a) may be accepted, although the instrument was some 12 inches away to the right from No. 64 instrument, which he "*wanted*"; but the suggestion that the plunger itself was operated unknowingly, as the result of contact with his body, while he replaced the case, is hardly credible. Demonstration of his actions, however, lent colour to the possibility, as he is only 5 ft. 6 ins. in height, and this plunger does not require a twist in operation as the others.

The following is an extract from his evidence in this respect:—

"Q. You must have released your '*Train-On*' ticket, and you must have plunged for the following train. You admit both these things?—A. No, I do not admit them at all.

"Q. You agree that both these actions must have happened, and emanated from your box?—A. Yes.

"Q. You must have released the '*Train-On*' ticket firstly, and you must have plunged to allow that Coulsdon train to come into the section?—A. Yes, but whatever happened I never saw it, and know nothing about it. I have no knowledge of it.

"Q. You do agree that both these things must have happened in your box?—A. Yes."

The important question therefore arises as to why the switch-hook was not in position to prevent the plunge, whether inadvertent or otherwise, and the following are also extracts from Childs' evidence on that point:—

"Q. To have released your plunger with your chest, you must have operated this cancelling ticket in some way?—A. Yes.

"Q. The switch-hook must have been off then?—A. Yes.

"Q. How do you account for it being off?—A. I cannot account for it.

"Q. Were you using the switch-hook?—A. Yes.

"Q. Are you used to using the switch-hook?—A. No, not regularly.

"Q. When you had used the switch-hook, when do you apply it?—A. On the second signal, as a rule.

"Q. When you receive and acknowledge it, do you apply the switch-hook?—A. As a rule, if I am at that end of the cabin.

"Q. You do not do it invariably?—A. It depends which end of the cabin I am.

"Q. You have two bells?—A. Yes, they are duplicate bells.

"Q. Did the people who taught you this cabin say anything to you about the hook?—A. No, I watched them and asked the reason why they used the hook.

"Q. What did they say?—A. Because the arm (of Pouparts block indicator) being on the home signal, it would come down when I put the home signal up.

"Q. Therefore, as you sometimes use the hook and sometimes don't, you can only account for this by the fact that the hook could not have been on?—A. It could not have been on, but I thought it was. It was on when I pulled the home signal afterwards.

"Q. Do you remember putting it on?—A. No, I don't remember.

"Q. Some time between the plunge for the Coulsdon and the pulling of the home signal it must have been on?—A. I cannot say exactly when it was.

"Q. Why do you think you replaced the switch-hook over the plunger when you pulled 67 signal?—A. I don't remember putting the switch-hook on at all; all I remember, it was on there when I pulled 67.

"Q. Did you put the switch-hook on just before you pulled the home signal?—A. I cannot remember; I pulled the home and looked down at the hook and it was on.

"Q. You don't remember putting the switch-hook on for the purpose of pulling the home signal?—A. No."

While Childs thus suggested that his incorrect plunge for the Coulsdon train must have taken place as the result of contact between his chest and the plunger, as he put the front of the case back into position, he also contradicted Hillman's evidence to the effect that the acceptance bell signals were exchanged, on the grounds that he did not perform this operation mechanically, particularly as it was his first day, and "*because I hadn't given the 'Train-out-of-Section' signal (for the London Bridge train). I still think I never made a mistake in any shape or form . . . I say the block bells were never sent*". Nor did Childs think that he could have overlooked the London Bridge train, although, in the circumstances, it is not otherwise clear why he did not immediately pull No. 67 signal and allow the train to draw into the station, after the re-setting of the junction, subsequent to the departure of the South London train.

10. With regard to Childs' account of the first "failure" at 6.5 a.m., Signalman F. W. Harvey, who had 35 years' service and had been in the box for eight years, expressed the opinion that "*Childs locked himself up by putting signals back in the wrong way*", viz., the starter, No. 69, before the home, No. 70. Harvey could not remember having experienced a treadle failure. He had supervised Childs and thought him fit to assume responsibility; he left him to work the box by himself under peak traffic. Harvey said Childs used the switch-hook, "*but not quite so regularly as me. He would miss it if he were at the other end, but when he came down this end he would put it over*". Harvey did not speak to Childs about it, as he "*let him work his own way. I came to the conclusion he knew what he was doing. He had to put the switch-hook over before he put the home back, otherwise Pouparts arm would go down*". Harvey said that there was danger in taking the switch-hook off prematurely, as some signalmen would wrongly assume that the section was free and offer forward the next train if they saw the block indicator thus fall. He said he always guarded against this by keeping the switch-hook on till the train had passed the starter, then removing it and transmitting the *Out-of-Section* signal in one movement.

Harvey said that the practices of relief signalmen varied in this respect; *"they may use it and they may not. If they are at the other end of the box, they do not use it I think it is because they are in some boxes where it is not necessary, but they should use it regularly in Battersea Park, where it is on the home If the switch-hook is on, everything is safe"*. Harvey added that he did not consider it exceptional for a signalman, in a busy box, to offer a train forward on seeing the block indicator fall, notwithstanding the absence of the *Out-of-Section* bell signal; he said that *"some signalmen might not notice the bell. Of course, there are a lot of bells ringing"*.

With regard to the working of Battersea Park box, Harvey said he could cope with it satisfactorily, and he had never felt the need of a second man; but the removal of the booking lad four years ago had resulted in further exertion on the part of the signalmen, as the lad *"used to sit at his book, and he used to see the up trains coming, so that we could describe them without looking out for them"*. Harvey made it clear that this referred to the head codes of approaching up trains, and not to tail lamps. He said that sometimes five trains are described and have to be memorised; he was of the opinion that the presence of a lad maintaining a train register, from which *"the signalman is able to find out what is coming"*, might have had preventive effect in this instance, particularly as a relief signalman was involved. I was impressed with the frankness of Harvey's evidence on this matter generally. His opinion was that traffic had increased by one-third since he had been serving in the box. He had never found it necessary to break the seals in the front of the case.

II. Area Inspector G. W. Matcham, who is 57 years of age, with 38 years' service, the last 13 in his present capacity, had been in the area for six months, since when he had seen Childs on two or three occasions in different boxes. He had passed Childs on the 29th January at Stewarts Lane, a busy mechanical Sykes goods box, which is looked upon as more complicated than Battersea Park. He agreed, however, that a signalman at Battersea Park is probably as busy as those at other important boxes, for example, Streatham and Windmill Bridge.

Inspector Matcham's examination of Childs on the 24th March lasted for 55 minutes; Signalman Harvey was told to let Childs take charge, and no mistake of any kind occurred. Inspector Matcham said that he asked Childs if he had had occasion to operate the releases, and received a reply in the affirmative, with explanation as to their working. He did not, however, go through each release, but accepted Childs' assurance that he knew them, when he said he had had previous experience. With regard to the special instructions, Inspector Matcham did not think it necessary to refer to them, but he *"satisfied me he was competent in all operations of the buttons and codes"*. Inspector Matcham added that *"as our relief men are taken from our smartest signalmen . . . you expect him to be almost as good as a District Inspector, and the first thing he should do when he goes into a box is to read his instructions—otherwise he would be lost"*. Inspector Matcham considered Childs temperamentally suitable for a signalman and *"very smart at his work I think he is a sound man and have never had any reason to doubt it. He is, in my opinion, one of the last men to lose his head under pressure"*.

As to what happened, Inspector Matcham's opinion is of value:—

"I think myself that both signalmen are involved. I believe Childs did drop his 'Train-On' tablet, but might have done it with his arm, or he might have done it when he was trying to get his release by trying different buttons. Whichever way he dropped the 'Train-On' tablet, that would lower the arm in Pouparts Junction box and would release the plunger in Battersea Park, if the switch-hook were not on, in which case the plunger could be used again. My impression is that Childs did not give the 'Out-of-Section' for the 7.30 a.m. London Bridge train, and that Hillman saw the arm down, the alteration to the 'Train-On' tablet at Battersea Park having put the arm down. With the continual ringing, Hillman might have got confused as to whether he had had the 'Out-of-Section' for the 7.30 a.m. train or not, and with the arm down he would have jumped to the conclusion that he had received the 'Out-of-Section' signal, in which case he would have offered the Coulsdon forward to Childs, and I think Childs was taken unawares and accepted it, and he

must have plunged. I think it is a question whether he used the switch-hook. He is none too sure, and a relief man does not use the switch-hook in every case. He could have put that over at any time. In an ordinary box, there is not much in the switch-hook, but in this box it has a most important function. When watching Childs working before passing him, I noted he was using the switch-hook each time. When he accepted a train he put the switch-hook over. Some relief men put the switch-hook over as a reminder when they get the 'Entering-Section' signal, but I am not referring to this particular box at Battersea Park, where the man usually puts it over as soon as he accepts, viz., as soon as he plunges. I watched Childs for 55 minutes, and he used the switch-hook on every occasion after plunging his acceptance, and if he had not used it I should have noticed.

"Q. What would you say to this, that Childs has told me that he did not always use it, that it depended where he was on the frame?—A. I know he has told you several things, but I am only telling you from my observations.

"Q. Actually you did not mention the switch-hook as you were watching him?—A. No."

12. Reference has already been made to Childs' demonstration to Colonel Hall, two hours after the accident. Chief Inspector R. Cogger, Signal and Telegraph Department, arrived on the scene about 9.0 a.m. and met Inspector R. J. F. Harland. Their evidence explained the demonstrations and tests referred to in considerable detail, and fully confirmed the fact that Childs must have pressed dead button C (second from left) instead of A. Until, however, the circuits were investigated and tested, they assumed at the time that Childs might have been right, and that the release had failed; at the same time, when Childs demonstrated what he had done, Inspector Harland thought it curious that he had pressed a button to obtain a dual release marked "Back-Lock in Rear" when apparently he wanted a front-lock release, to enable him to pull his own slide.

Tests were subsequently made with the correct button, A, and the circuit functioned properly. Inspector Harland found that all other tests were satisfactory, such as the lock between the plunger and the *Train-On* tablet, insulation of the system generally, and the absence of any possibility of physical contact between two lines, when a release given on one line might "free" the instrument at Pouparts Junction on the other line. Chief Lineman F. G. Frampton similarly gave evidence of satisfactory subsequent tests on all the apparatus concerned at Pouparts Junction; the main consideration, of course, was to ensure that no *false-clear* failure had allowed No. 19 signal to be cleared without a plunge from Battersea Park. Finally, Chief Lineman C. A. Gillham and Electrical Fitter Winslett also gave satisfactory evidence on various matters relating to maintenance of the equipment.

Conclusion.

14. Notwithstanding the assistance afforded by the Company's officers, this investigation was rendered difficult by the negative attitude of Relief Signalman F. G. Childs, as to what, in fact, transpired during the crucial period from 7.57 a.m. to 8.1 a.m. He was not a satisfactory witness; but I had the advantage of seeing him in the signal box two hours after the accident, before he was relieved from duty, and it is well to record that my immediate impression of his behaviour was favourable, and his actions and speech were clearly not those of a man who felt the onus of having made any kind of mistake, still less of one who was responsible for a disastrous collision.

The accident resulted from the improper entry of the Coulsdon train into the Pouparts Junction-Battersea Park section, under a clear starting signal at Pouparts Junction, when the section was still occupied by the preceding London Bridge train. No blame attaches either to Motorman A. Anthony, who, though seriously shaken, had a remarkable escape, or to Guard R. W. Adamson.

The three possible causes which might have brought about the collision were:—

- (a) A "false-clear" failure of the Sykes block instrument at Pouparts Junction, combined with the irregular admission into the occupied section of the Coulsdon train by Relief Signalman T. G. P. Hillman, without receiving the acceptance block bell signal from Signalman Childs.

- (b) The failure on the part of Hillman to replace his starter, No. 19, behind the London Bridge train, and his subsequent irregular release, by means of the key, of his home signal, No. 18.
- (c) An irregular release by Childs from Battersea Park of Hillman's block instrument at Pouparts Junction for the Coulsdon train, while the section was still occupied by the London Bridge train.

The evidence makes it clear that (a) may be dismissed; the electrical tests, which were carried out immediately after the accident, proved that all the apparatus concerned was in efficient working order, and that insulation resistance was satisfactory. Such a thing as a "false-clear" failure of the block instrument at Pouparts had not happened for at least 10 years, and, so far as this feature is concerned, the installation has operated satisfactorily since the accident without attention of any kind.

With regard to (b) and (c), there was conflict of evidence between the two men. On the one hand, Hillman affirmed that the *Out-of-Section* bell signal was transmitted by Childs for the London Bridge train, that he saw his block indicator lowered, that he immediately offered the Coulsdon train to Childs who accepted it, and that his indicator was then raised while the Sykes section instrument simultaneously fell to "free".

On the other hand, Childs denied having transmitted the *Out-of-Section* bell signal for the London Bridge train; he also denied having received the offer of the Coulsdon train and having accepted it. Indeed, the feature of his evidence was that he maintained that he could not remember this acceptance; nor would he admit its possibility. He affirmed that he could not remember his own operation of the switch-hook; but he did memorise and stress the fact that it was in the applied position when he pulled signal No. 67. There is no reason, except confusion, why the one should be remembered and not the other; I think his evidence on this and other matters cannot be relied upon, and, in all the circumstances relating to his previous actions, which culminated in the drastic step of cutting the seals and laying bare the instruments, a clear and precise account as to the facts was hardly to be expected.

By contrast, there was nothing to disturb Hillman's balance. Traffic was moving smoothly, he was experiencing nothing abnormal, and when informed of the accident by Signaller Henrick of Longhedge, he expressed surprise and asked for the message to be repeated. There is nothing to suggest that his strong denial of the use of his release key should be disregarded, and I accept his evidence that the Coulsdon train was not permitted to enter the section until it had been offered to, and accepted by, Childs in the usual manner by bell signal.

I conclude therefore that the fundamental actions which led to this accident were, first, the "cancellation" of the London Bridge train, and, secondly, the "plunge" to accept the Coulsdon train and to release the Pouparts Junction starter No. 19; both must have emanated from Childs, and serious responsibility therefore rests upon him.

In the circumstances, the receipt or otherwise by Hillman of the *Out-of-Section* bell signal for the London Bridge train, before he saw his block indicator fall, is relatively a minor question. Its transmission may seem to have been improbable, and in any case it did not require acknowledgment by Hillman. When the block indicator (2-position only) normally stands lowered, a signaller under heavy pressure is admittedly likely to accept its lowering as justification for offering forward the next train, without paying particular attention to the accompanying bell signal. Although incorrect, this cannot be seriously criticised, having regard to the traffic conditions and to the frequency of bell signals, provided that proper use was being made by Childs of the switch-hook, as Hillman, from his experience of both boxes, was entitled to expect. On the whole, therefore, in the absence of any confirmatory evidence, I think it fair to give the latter the benefit of any doubt which may exist in this respect, and relieve him from even a small measure of contributory responsibility.

Indeed, it is obvious that the onus must lie with Relief Signaller F. G. Childs. It was not a case of failure of interlocking or mechanism, but of breakdown of block working by his incorrect manipulation of the signalling equipment. He is a man with a clear record, was well spoken of, and by temperament seems imperturbable; but I conclude that, in lacking due sense of responsibility and

by over-confidence, he deceived himself and others as to his intimate knowledge of the equipment. In order to avoid delay and consequent inquiries, with no-one present to fall back upon, he apparently became confused in trying to rectify his failure, with the result that he unsealed his instruments in circumstances to which the Special Instructions did not apply. Had he realised their purport, and the danger of such action, no doubt he would have adopted the proper course and sought assistance in the flagging of the South London train through the station.

15. In the light of the evidence and of the full consideration which has been given to the circumstances surrounding Childs' actions, it seems desirable to summarise what appears to have happened after he assumed charge at 6.0 a.m.

He alleged that he had experienced a treadle failure on the up main five minutes after he assumed duty. There was, however, no record of recent failure of the treadle in question, *and* the failure did not repeat itself; it therefore seems more probable that there was in fact no treadle failure, and that he himself had caused the hitch by replacing signal slides in the wrong order, namely, the starter before the home. This is a mistake which a signalman who is experienced in the Sykes system naturally avoids, but it may arise when working a frame with which he may not be entirely familiar.

All went normally for nearly two hours until the passage at 7.57 a.m. of the 7.54 a.m. down Victoria to Beckenham train on the down local; at about this time, Childs apparently accepted the South London and the London Bridge trains, and decided, according to schedule, to give the former preference, although it was a little late. He obtained acceptance for it from Battersea Pier "A", and then attempted to clear signal No. 64. Unfortunately, however, he made a second mistake, which can easily occur before a man is at home on this frame; he overlooked the setting of the trailing junction points No. 5 (although he had already dealt with the same movement five or six times that morning), and the mechanical locking rightly prevented him from pulling the slide and lowering signal No. 64. His troubles therefore began at about 7.58 a.m. under conditions of heavy traffic.

The jar in pulling the slide forward, or, more probably, the attempt to replace it, caused the electrical rotation lock to drop into the *front* lock notch; the slide therefore became locked between the full normal and the mechanical locking positions. In fact, the Sykes instrument, applicable to this lever went from "free" to "locked", and even after Childs appreciated what had happened on examining the frame, and had set the junction points, the slide naturally could not be moved. He then realised that the signal could not be lowered and that traffic would inevitably be delayed unless he promptly obtained a release in co-operation with Battersea Pier "A."

He attempted to obtain this release in the proper manner, but, judging by his subsequent demonstration to Colonel Hall after the accident, he presumably actuated dead button C (labelled "Back Lock in Rear", and situated immediately over the "locked" indicator of signal No. 64, for which the release was required), instead of button A. This was Childs' third mistake in his first two hours in charge of this box, and proved his insufficient knowledge of the equipment.

Just as he had previously assumed that a treadle had failed, he erroneously concluded that the releasing apparatus had also failed. He denied that he then attempted to effect the release by pushing one, or more than one, of the other seven buttons (two of which were also dead); but even had he then pressed the right one, A, Signalman Truelove of Battersea Pier "A" cannot have been co-operating at the same time, and hence the failure to release.

Instead, however, of frankly admitting the position to Truelove, or calling the station staff to his assistance to flag the South London train, in which event the passage of the train would have automatically effected the release by the operation of the treadles—although considerable delay would certainly have occurred and would have been cumulative—he proceeded to cut the seals and open the case of Sykes instruments, in order to lift the lock on No. 64 slide by direct manipulation. He alleged that he had done the same thing some years ago at Grosvenor Road; moreover, he could claim that there was nothing in the Special Instructions on the subject to show that he was not

authorised to act in this manner. On the other hand, this action was his fourth mistake in the handling of the equipment, and the one which directly led to the accident.

The effect of it was that, if he had not already operated button B (which seems unlikely) in endeavouring to obtain the co-operative release from Battersea Pier "A", he must have done so while fumbling to release the lock on No. 64 instrument, or while putting the front of the case back into position. The latter seems the more likely, and I noted that, during the first of three demonstrations in the box on the 12th April, his right palm chanced to rest immediately over this button when he forced the front of the case back into position after slight jamming.

Consideration of this demonstration, of the sequence of times, and of his probable actions, indicates that not more than $2\frac{1}{2}$ minutes were occupied from the time that the slide became locked until Childs finally replaced the front of the case at about 8.0 a.m., before which time it appears to be unlikely that the "cancellation" took place.

The operation of button B mechanically removed the "*Train-On*" indication (for the London Bridge train), and left the Sykes plunger at Battersea Park free to be pressed (incorrectly) a second time, if the switch-hook was not then applied. It would also have had the effect of lowering the block indicator at Pouparts Junction, in the absence of the over-riding control of the switch-hook. That must, in fact, have been the state of affairs when the "cancellation" was effected, Childs having failed to apply the switch-hook on receipt of the *Entering-Section* signal for the London Bridge train.

With regard to the immediate offer by Hillman, and the subsequent acceptance and "plunge", Childs' suggestion that he depressed the plunger with his body is hardly tenable. Apart from Hillman's evidence as to Childs' acceptance of the Coulsdon train by bell signal, the circumstantial evidence afforded by the successive positions of the switch-hook is of still greater value to discredit this possibility. Childs stated that it was applied when he pulled No. 67 signal at about 8.2 a.m., just before the collision; yet it must have been off to have enabled the acceptance plunge to be given for the Coulsdon train at 8.0 a.m., immediately after the "cancellation" was effected, and (according to Hillman) 1 to $1\frac{1}{2}$ minutes before this train passed Pouparts Junction.

Only one inference, therefore, is possible. As already stated, Childs cannot have used the switch-hook when the London Bridge train entered the section; but he must have applied it at 8.0 a.m., after the plunge had been effected for the Coulsdon train, or on receipt of the *Entering-Section* signal at 8.1 $\frac{1}{2}$ a.m., as the natural sequence to another ordinary block acceptance and plunge, in response to the offer transmitted by Hillman, after Hillman saw the indicator fall.

The South London train probably cleared the junction at about the latter time, 8.1 $\frac{1}{2}$ a.m. Childs immediately reset the points, and lowered the down local signals to allow the Epsom Downs train (which had also been waiting for the South London train to cross in front of it) to go forward. Half-a-minute after this, the South London train cleared Battersea Pier "A" on the up local, when Childs offered, and received acceptance for, "*a following train*" (in fact, the Coulsdon train), signals Nos. 66 and 67 being lowered for it just before the collision.

Summary.

16. The South London train was detained about two minutes at No. 64 signal while Childs was manipulating the apparatus to permit him to lower this signal, the slide of which had become accidentally locked. The London Bridge train came to a stand at No. 67 signal a little after the South London train had arrived; after a wait of nearly three minutes, the London Bridge train was about to proceed, in obedience to the clearing of No. 67 signal, when the collision occurred, as the result of the improper entry into the occupied section, under clear signals, of the following Coulsdon train.

Relief Signaller F. G. Childs was in charge of Battersea Park Junction box for the first time, and his duty had commenced two hours previously. His first major error was to depress release button C, instead of button A, in his attempt to free the slide of signal No. 64; not having attained his object, he

then failed to telephone to the signalman at Battersea Pier "A" to report what he thought had happened, namely, failure of the releasing apparatus, and ask for advice.

Instead, to avoid delay and the possibility of subsequent criticism for his error (the consequences of which no doubt he then began to realise), he broke the seals and exposed his instruments to all the dangers of unskilled manipulation. Even modern equipment would not be immune from interference of this character; but the integrity of Sykes apparatus, which includes comparatively easily operated electric releases, is naturally more prone to breakdown if so abused.

The result, in the hands of a man who, in being over-confident, lacked knowledge and became confused, was the removal of the "*Train-On*" indication and the freeing of the plunger. It may be that Signalman Childs failed to transmit the *Out-of-Section* signal for the London Bridge train; but, having regard to the evidence of Signalman Hillman, in respect of the acceptance of the Coulsdon train by bell signal, I conclude that Childs, in his dilemma, overlooked the London Bridge train, the two becoming temporarily merged in his mind.

The crux of the case was Childs' ability to effect the "cancellation" of the London Bridge train without Hillman's co-operation, thus leaving his plunger free to be depressed a second time. This is a normal feature of Sykes apparatus generally, and is possibly open to criticism; in fact, dual cancellation is consequently in operation between any two of the electro-mechanical boxes in this installation. The second important point was Childs' probable failure to use the switch-hook in the normal course—his essential safeguard—on receipt of the *Entering-Section* signal for the London Bridge train.

Remarks and Recommendations.

17. This accident (like those at Bow, 1st April, and Crewe, 14th April) again drew attention to the question of the behaviour of rolling stock in collision. The rear motor coach of the London Bridge train, in which nine of the ten fatalities occurred, was telescoped when the leading motor coach of the Coulsdon train overrode it; the momentum of the latter train had to be absorbed. Had the bodies of these two coaches been materially stronger, the results might have been different, but it is impossible to say whether they would have been more or less serious, so far as casualties were concerned; the same uncertainty applies to the case at Crewe. In respect of the collision at Bow, it seems probable that had the leading train been fitted with the latest type of shock-absorbing buffer, casualties might have been reduced.

With regard to the circumstances at Battersea Park, the opinion of the Chief Mechanical Engineer has been recorded. Resistance to collision is not the primary consideration in the design of rolling stock; nor can dynamics be eliminated by the use of what is called "all steel" construction. But if wood is kept away from electrical equipment, and coupling and buffer gear are adequate, the passenger-carrying portion of the bodies even of motor coaches, on surface railways, need not necessarily be composed entirely of steel, if the various other considerations concerned do not justify such construction. It is clear that the right policy is to continue to direct available resources towards the prevention of accidents rather than towards minimising their effects. The following observations are made from that aspect:—

18.—(a) Since the instruments of this electro-mechanical Sykes system of signalling have been sealed, an Instruction has been in force for many years authorising the signalman to break the seals in the event of the special cancelling apparatus failing; but, in the circumstances described, this action was both unusual and unnecessary, and certainly should not have been taken by an experienced signalman. One obvious means of preventing a recurrence is to apply padlocks in place of the seals, and this was immediately adopted by the Company. No one except the skilled lineman will be able in future to open the instruments, and the Instructions have been withdrawn. At the same time, the depression of the plunger cancellation buttons has been prevented, except after removal of split pins; the use of this release will thus require more deliberate action.

(b) The latter is a satisfactory temporary measure, but, having regard to the traffic conditions and to the experience gained from this accident, I recommend that, in order to bring this box into line with the rest of the Victoria installation, the co-operative feature should now be applied, if practicable, as an emergency safeguard in connection with the cancellation of the plunger on the three up lines.

(c) Similarly, in view of the circumstances which led to this breakdown in block working, consideration appears to be desirable as to the function, and use being made, of the switch-hook, both throughout this power installation and under ordinary Sykes mechanical operation, having regard to the differing systems and practices now in force on the Central, Eastern, and Western Sections. It was presumably designed to act as a reminder of the occupation of the section, and as an additional safeguard against the second plunge, in which case its application on acceptance, or on receipt of the *Entering-Section* signal, should apparently be made obligatory. This appears to be particularly necessary where, as at Battersea Park, the block clearance point is ahead of the signal, the replacement of which restores the block indicator in rear to normal and re-sets the plunger for a second acceptance.

(d) It would also be well to consider the justification for, and practicability of, substituting the Company's latest form of manual block with its associated track circuiting or the equivalent, or of introducing increased safeguards in connection with the block release, where the ordinary mechanical Sykes system is retained in operation under the dense traffic conditions of the suburban areas.

19. In my opinion, Relief Signaller Childs' actions showed that even a man with a good record and long experience cannot necessarily be trusted to take charge of a box of this character without the most careful supervision and examination under peak conditions; no doubt procedure will be tightened up to ensure an intimate knowledge of all Special Instructions, of the detailed working of all equipment, and of the steps to be taken in every kind of emergency.

20. I am inclined to think that the London Bridge train might not have been overlooked had a booked entry been made of it in a train register. This would necessitate the re-establishment of a booking lad, a step which appears to be desirable in the interests of safety and efficiency, at this particular box and under the present system of signalling, having regard to the location of the box and its importance in respect of train description. In the meantime, I understand that a mirror is being provided to assist the signaller in observing head codes of up trains. On a busy frame of this kind, any such aid in the relief of strain seems to be justified under modern conditions.

21. Finally, it is hardly necessary to add that a *Train-Waiting* track circuit in rear of the home signal would have prevented this accident. The reason for its absence was the fact that the Sykes system is in operation and track circuiting is not a usual, nor a normally necessary, adjunct to any system of lock and block. Moreover, this electro-mechanical installation—one of the few examples in this country—has stood the test of nearly 30 years' service under the most trying suburban conditions; indeed, it might well be claimed that such dense traffic could not otherwise have been worked with the same measure of safety and facility. Further, the home signal concerned did not, of course, differ in principle from the large number of others where this block system exists.

During the last ten years, however, the Company has carried out an exceptional amount of re-signalling of modern colour-light type, employing continuous track circuiting; much credit is due for the progress already made, having regard to the pressure under which these works have been carried out, and the programme is not yet complete. All the London terminal stations on the system have now been dealt with, except the Victoria installation (Central side), and I understand that the scheme for this is under consideration. Reference has already been made to the density of traffic at the time of this accident, to its heavy increase during the last five years due to the extension of electrification, and to the pressure on any manual block system which such density entails; the elimination of the latter is of importance under modern requirements of still closer headway, and I recommend that the reconstruction of this installation should now be proceeded with, although from the magnitude of the scheme it must necessarily take time to mature and bring into effect.

With regard to the future, in view of the advantages to be gained under heavy traffic conditions, I also hope that the Company, in still pursuing their progressive policy, will give early consideration to the further extension of this programme on the main line via Streatham and Croydon, to link up with the existing colour-light installation between Coulsdon and Brighton.

I have the honour to be,

Sir,

Your obedient Servant,

A. H. L. MOUNT,

Lieut.-Colonel.

The Secretary,
Ministry of Transport.

APPENDIX I.

Lieut.-Colonel A. H. L. Mount's Report, as Assessor to the Coroner for West London, of the Inquest held on the 20th April, 1937.

Ministry of Transport.

7, Whitehall Gardens,
London, S.W.1.

21st April, 1937.

Sir,

I have the honour to report for the information of the Minister of Transport that, in compliance with the Appointment of the 17th April, 1937, I acted as Assessor to the Coroner on the 20th April at the Inquest on the death of certain persons, occasioned by the accident which occurred on the 2nd April near Battersea Park on the Southern Railway.

Representatives of the Railway Company, of the National Union of Railwaymen, and of the Associated Society of Locomotive Engineers and Firemen, were present.

The evidence of seven witnesses was heard. These included six (out of 20) witnesses who were called at my Inquiry, which was held on the 7th and 8th April, and adjourned until the driver of one of the trains concerned was able to attend. He had recovered sufficiently to attend the Inquest and give evidence.

After the Coroner had summed up the evidence, the Jury retired for about 15 minutes, and a verdict was entered that:—

“The deceased persons died from injuries received in a railway accident near Battersea Park Junction on the 2nd April when a collision took place between two trains, owing to one of them having been wrongly admitted into an occupied section, as the result of error on the part of Relief Signaller Frederick George Childs, and that death was accidental.”

I agree with this verdict, and the following rider was added:—

“The Jury is satisfied that everything possible to ensure the safety of the travelling public is done by the Railway Company.”

In view of the full Report which I hope to present at an early date on this accident, it does not appear to be necessary to deal at greater length with the proceedings at the Inquest.

I have the honour to be,

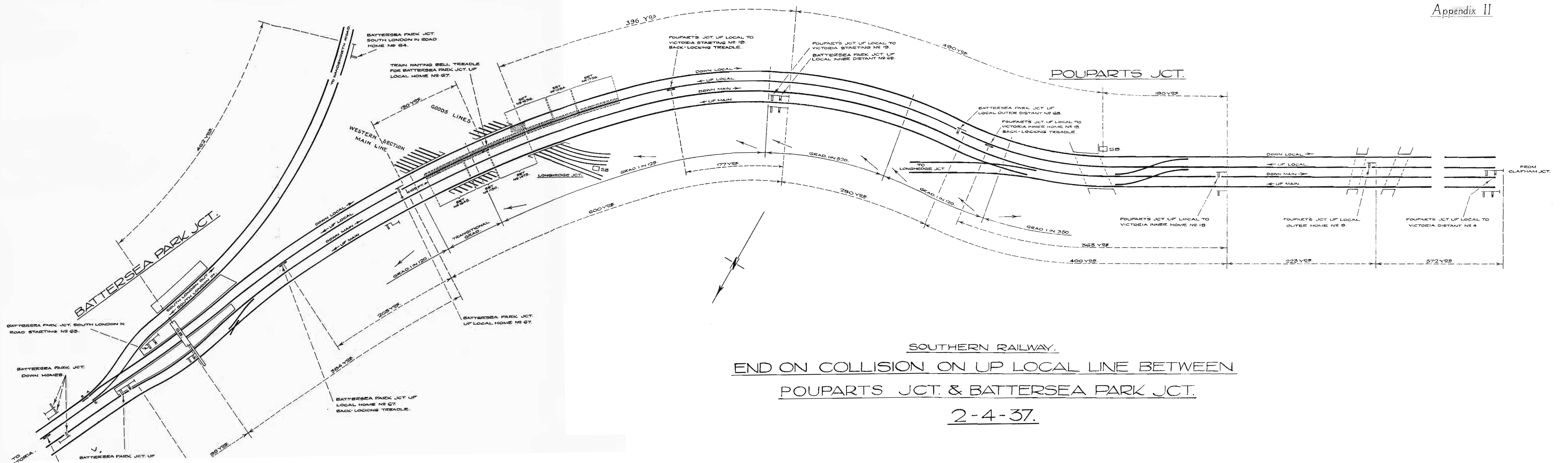
Sir,

Your obedient Servant,

A. H. L. MOUNT,

Lieut.-Colonel.

The Secretary,
Ministry of Transport.



APPENDIX III.

Lieut.-Colonel G. L. Hall's Description of the System of Signalling.

The system of signalling in use on this section of the line is that known as SYX Lock and Block. Essentially the principle of operation is as follows:—

Each signal lever is connected by means of rodding to a SYX instrument, which shows two indications, either locked or free. The instrument associated with the signal which admits a train into a block section normally shows locked, and in this position the instrument rod is raised and the signal lever locked. The rod is held in this position by means of a permanent magnet and detent in the instrument. When it is required to send a train into the block section, the appropriate bell signal is sent to the box in advance. If the Signaller at that box is in a position to accept the train he pushes in a plunger. This action completes an electric circuit, which, by means of a coil winding in the instrument of the section signal in rear, neutralises the effect of the permanent magnet, and so allows the lock rod to drop. This frees the section signal lever and gives the free indication in the instrument. The section signal lever is then pulled, and, when the signal lever is replaced, the instrument becomes relocked and cannot be freed until a second release is given by the Signaller at the box in advance. In order to ensure that the signal is replaced to danger behind a train, rotation locking is in force which prevents the signal in rear from being pulled until the signal ahead has been pulled and replaced. This replacement cannot be effected until a treadle ahead of the signal has been actuated by the train. This treadle, when depressed, closes a contact which releases the backlock on the lever of the signal and so enables it to be replaced.

At the receiving end, i.e., at the signal box ahead from which the train is accepted, the plunger (which releases, as explained above, the section signal in rear) becomes automatically locked after use until the appropriate signal at the acceptance box has been pulled and replaced; this replacement is effected by the operation of a treadle ahead, as has already been described.

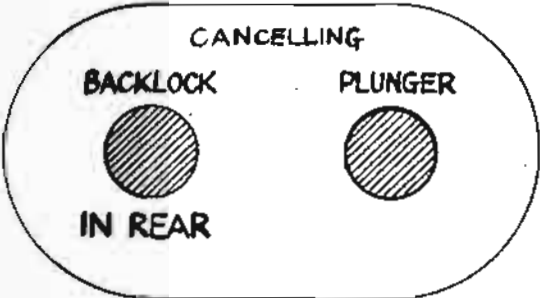
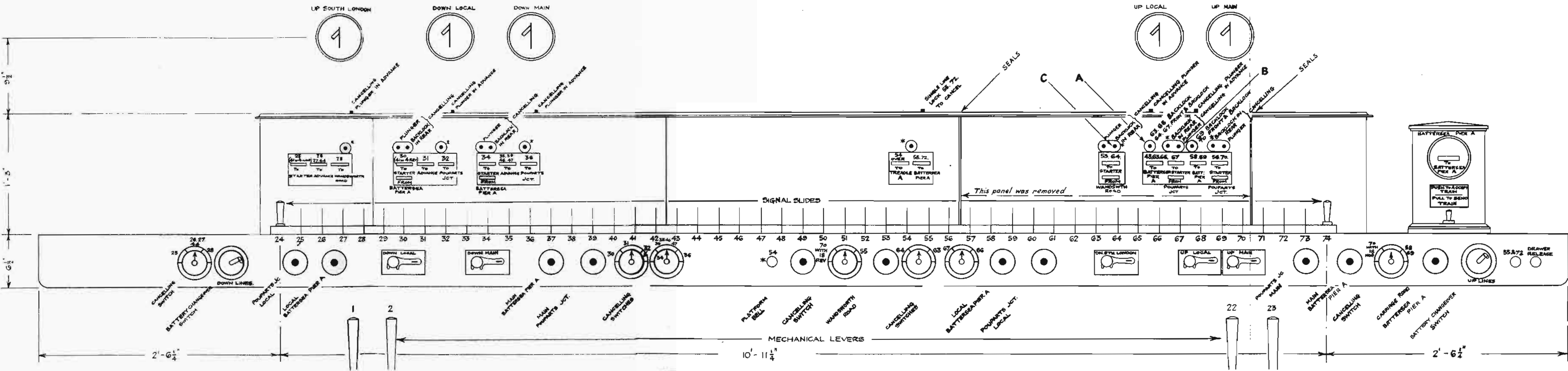
The effect, therefore, of this rotation locking is that each train should pass through the block section, and beyond the controlling signal of the box ahead, before a second train can be sent forward.

In addition to the locking between the plunger and the signals, block indicators are provided to show whether the section is clear or occupied. These indications take the form of miniature semaphore arms, and on this section of the line they are normally clear, i.e., the miniature arm is normally lowered. When the plunger at the box in advance is operated, this miniature arm is raised to the horizontal position, and remains in this position until the section has been cleared. Associated with the plunger is a hook switch, which, when turned over, prevents the plunger from being pushed in and also raises the block indicator arm at the transmitting end to the horizontal position if this has not already been done by the depression of the plunger. This hook switch, therefore, serves as a physical reminder that the plunger is not free to be pushed and is commonly employed for this purpose when a train is offered by the Signaller in rear which the Signaller in advance is not in a position to accept.

In order to provide for the cancellation of a train which after acceptance does not, in fact, proceed through the section, apparatus is provided to enable the Signaller to reset the mechanism and to operate his plunger a second time.

SOUTHERN RAILWAY
BATTERSEA PARK JUNCTION
INSTRUMENT SHELF

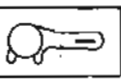
2.4.37.



BELL PLUNGERS
SHOWN THUS:-



PLUNGERS &
SWITCH HOOKS
SHOWN THUS:-



BUTTONS
NOT IN USE, THUS:- *



APPENDIX V.

COLLISION AT BATTERSEA PARK—2ND APRIL, 1937.

Trains in the vicinity at 8.0 a.m. (approx.).

UP SERVICES.

Train.	7.37 a.m. London Bridge S.L.L.				7.39 a.m. London Bridge Spur.				7.31 a.m. Coulsdon North.				6.10 a.m. Tonbridge.			
Line Run.	L		L		L		L		L		L		M		M	
	Booked.		Actual.		Booked.		Actual.		Booked.		Actual.		Booked.		Actual.	
Clapham Junction					7.57½	7.57½		7.57½	8.0½	8.0½	8.1	8.1	8.0	8.1	8.0	8.4
Pouparts Junction					7.59		7.59½		8.2		8.2		8.3			8.6
Battersea Park	7.57½	7.58	*7.58½	8.1½	8.0½	8.0½	7.59½		8.3				8.4		Pouparts Jcn.	
Victoria... ..	8.1	—	8.4½		8.3½		Battersea Park Up Home Signal		8.6				8.7		Up Home Signal.	

DOWN SERVICES.

Victoria ...	Booked.		Actual.		Booked.		Actual.		Booked.		Actual.		Booked.		Actual.		Booked.		Actual.		Booked.		Actual.	
Battersea Park	—	7.54	—	7.54	—	7.56	—	7.56	—	7.58	—	7.58	—	8.0	—	8.0	—	8.0	—	8.0	—	8.4	—	8.4
Pouparts Jcn.	—	7.57	—	7.57	—	7.59	—	7.59	—	8.1	—	8.3½	—	8.3	—	8.3	—	8.7	—	8.7	—	8.7	—	8.7
Clapham Jcn.	7.58½		7.58½		8.0		8.0		8.2½		8.4		8.4½		8.5		8.6½		8.6½		8.9		8.9	
	8.0	8.0	8.0	8.0	8.1½	8.2	8.1½	8.2	8.4	8.4	Stopped at Battersea Park Home Sig. by 7.37 a.m. Lon. Bdge crossing up. Then stopped just north of Station by loss of current.		8.4½	8.5	Stopped between Battersea Park and Pouparts Jcn.		8.6½	8.6½	Stopped at Battersea Pier 8.2 a.m.		8.7	8.8	Stopped at Battersea Park Home Signal.	
Line Run.	L		L		M		M		L		L		M		M		L		L		M		M	
Destination ...	Beckenham				Epsom				Epsom Downs				Brighton				West Croydon				East Croydon			