

The LONDON MIDLAND and SCOTTISH RAILWAY



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THE LMS
SOCIETY



HINTS for SIGNALMEN

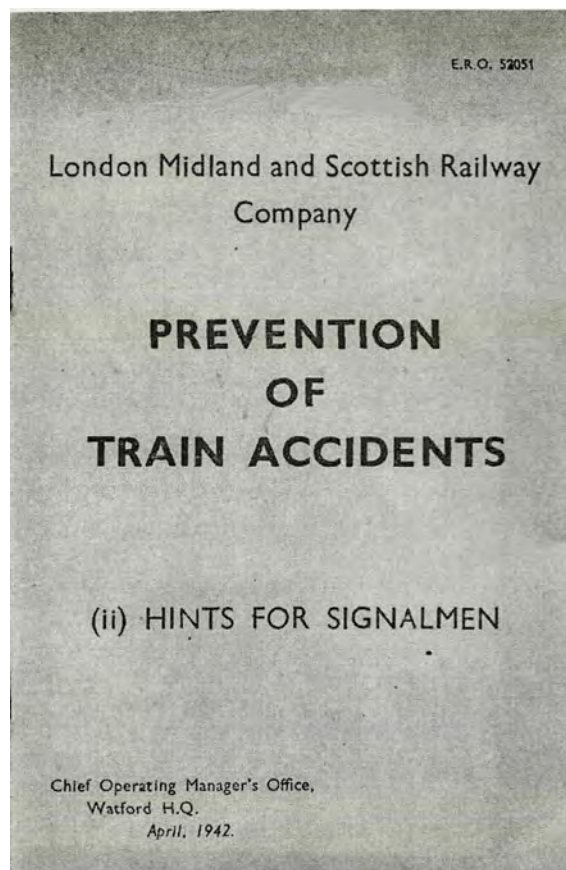
L. G. Warburton.
with photo captions by Reg. Instone.

LMS Society Monograph No 4

Introduction

In June 1937 the LMS Railway issued a booklet entitled "Prevention of Train Accidents - Hints for Signalmen" and thought fit to re-issue it as ERO 52051 In April 1942. Whilst the hints have been edited it is hoped readers will gain an insight into the enormous responsibilities of thousands of signalmen in thousands of signal boxes that regulated trains under the Absolute Block System in the era of steam, block sections and semaphore signals.

Plate 1.



The cover of the booklet LMS ERO 52051

The booklet was prepared in the Chief Operating Manager's Office, the Introduction of the 1942 edition read as follows. "The first booklet was issued in June 1937, and signalmen were asked to review frequently the hints, which would assist them to avoid mistakes which might have very serious consequences. Since that time nine out of ten of the train accidents caused or contributed to by signalmen occurred owing to one or other of these hints being overlooked, an emphatic indication of the value of the hints to all signalmen, provided they will frequently read and profit by them", Signed T. W. Royle, Chief Operating Manager.

The booklet went on to state the twelve main causes of train accidents for which signalmen have been responsible with hints to aid the signalman.

- 1. Trains being irregularly admitted into sections occupied by other trains or portions of other trains. Usually referred to as "two in a section".**

Hints. The train register book when used correctly is a valuable record of the state of the line and a great aid to the signalman's memory. Essential that if a 'signal box lad' is employed he must only enter those signals which he sees or hears given or received, or is told by the signalman to enter. He must never assume that he has missed or overlooked any signals, but immediately consult the signalman if in any doubt or if signals are not in the correct sequence with the signals he has entered in the train-book. If this is done, then the signalman can review the position and probably detect any differences or irregularities in time to prevent them leading to accidents. The second point was to ensure that fog signalmen are called out immediately the fog object is obscured and the time the fog-men arrive and depart is noted in the train register.

The causes of this type of accident can be divided under two headings –

- 1. Signalmen irregularly authorizing trains to approach from the box in the rear and –*
- 2. Signalmen irregularly authorizing trains to go forward to the signal box in advance.*

Of these 1 has caused the most serious accidents for which signalmen have been responsible with a need to especially note the following points.

a) *Pay the utmost attention to the vitally important duty of seeing the tail lamp or receiving other information that the train is complete. Never think you have seen the tail lamp or that a train has passed unobserved otherwise a train maybe admitted into the rear section whilst it is occupied by a train or portion of a train.*

b) Never assume that the block indicator for the rear section is at "Train on Line" position because you have forgotten to give "Train out of Section" signal for a train which has passed, even if the train register book confirms the assumption; it is very probable that the block indication is correctly stating that there is a train in the rear section and the train register entry has been momentarily overlooked. Make sure of the facts before the "Train out of Section" is given and another train is accepted.

When dealing with trains where there are more than one up and down line, ensure that the correct block instrument is used. When assisted by fog signalmen ensure that the tail lamp has been observed before giving the "Train out of Section" signal. Where an additional home signal is provided at least ¼ mile in rear of the home signal the "is Line Clear" signal must not be acknowledged during fog or falling snow when the line is clear only to the inner home signal, unless fog signalmen are on duty at the distant signal and the outermost home signal. Accidents can be prevented by looking carefully at the correct block instrument before the last stop signal is lowered. If the signalman fails to give the "Train Entering Section" signal the train will be in the advance section with the block instrument stating that not only the signalman in that box but the signalman in advance that the section is clear. This may lead to a second train being allowed to go forward because the "Line Clear" indication is thought to be correct. If the "Train Entering Section" signal is given prematurely, the block indication will state to the signalman in that box and the signalman in advance that the train is in the section that is actually clear. The final point was to place the fixed signals back to the danger position promptly otherwise they may be passed by a following train if left 'off' for too long.

2. Signalmen overlooking stationary engines trains or vehicles inside the home signal when accepting other trains from the signal box in the rear or when lowering signals for trains to go forward.

Hints - It was vital that all lines were scrutinised during all movements on or across them, particularly before an "Is line clear" bell signal was accepted or the fixed signals lowered for another train. It was also, necessary to ensure that the greatest care was made to ensure that all engines, trains and vehicles were properly protected by the Train Signalling Regulations and also the use of lever clips (collars) and the special appliances for placing on the commutators or handles of the block instruments.

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4. Obstructing the line inside the home signal irregularly, either by reversing facing points towards an occupied line or authorising other movements, before an approaching train accepted under Regulation 4 has come to a stand at the home signal. (Regulation 4 "Line clear or giving permission for a train to approach".

Hints -The need to keep the line clear and to not authorize any conflicting movement within the required distance from the home signal when a train had been accepted and was approaching. All points necessary for the approaching train were to be in their proper positions with facing points bolted where provided before a train was accepted, such points to remain in that position until the signalman was authorised to move them.

5. Failing to pull over the correct levers for shunting movements, particularly when shunting engines or trains from a line or siding on to a running line in

order to proceed into the advance section, with the result that engines or trains have gone forward on the wrong line undetected.

Hints -This emphasized the need to set the points correctly and use the fixed signals where provided to gain the benefit of the interlocking and also to see that the movements travel in the required direction, particularly when shunting engines or trains move from a siding to a running line, otherwise trains may proceed undetected in the wrong direction.

5. Failing to carry put the Rules and Regulations during repairs to the permanent way, points or signals, resulting in trains passing over lines or points which were unsafe.

Hints -This emphasized the need to have a complete understanding with the ganger, lineman, man in charge, or other authorised person before any work commenced and that the required entries have been made in the train register and signed. If the locking is disarranged or points and signals disconnected or under repair the hand signalman must act under the signal-mans instructions and to ensure he understands what he has to do. Before any movement over affected points was authorised the signalman must give the hand signalman clear instructions and obtain his assurance that all the points over which the train was required to pass were in their proper places and clipped. These precautions to be maintained and the line to be regarded as obstructed until the person in charge of the work informed the signalman that the work is completed or the obstruction removed and any locking had been tested and proved to be correct with the required entry in the register made and signed.

6. Failing to properly warn drivers in accordance with the Permissive Regulations before allowing trains to enter a section occupied by another train.

Hints - Permissive Block was a section between two signal boxes to which a second train may be admitted in spite of the fact that it was still occupied by the previous train. The principle allowed trains to get along the route as far as they could towards the place where the train ahead was temporarily detained. If the first train had not cleared the section when a second, third or even fourth train was about to enter, then the driver(s) must be warned which was done by keeping the starting signal danger until the train was nearly to a stand and then clearing it. Having been warned the driver must proceed at reduced speed, keeping a good lookout for the train in front. Only freight trains could be worked in this manner. All passenger trains must be worked by the absolute block system. A passenger train could travel along a "permissive" line but it must be signalled under the absolute block regulations. Rule 55 required a driver, fireman or guard to immediately report to the signalman that his train was standing at the Home Signal and if this was not done the signalman was to report the fact.

7. Failure to comply with the important part of Regulation 24 ie clause (b) (i) has led to serious accidents.

Hints - Regulation 24 dealt with the opening and closing of signal boxes that could be switched out. Unless special instructions were issued to the contrary the signalman must observe this clause as his first duty when opening his box to ensure that he has full information on all matters necessary to enable him to discharge his duties properly before switching in. To do this he must communicate by speaking instrument to ascertain what trains, if any, are in the section or are signalled, whether any instruments have failed etc.

8. Failure to carry out the rules governing the operation of fixed signals.

Hints – There are seven main features regarding the operation of fixed signals –

- I. They must not be lowered to authorize movements until the rules have been carried out*
- II. They must be restored promptly to protect the train that has just passed, but take care not to do it prematurely.*

- III. *The movement of a signal lever does not guarantee that the signal has responded, and it is the indication of the signal that controls trains. It is therefore important that the signals respond to the levers by observation and reference to the repeaters.*
- IV. *Should a signal be lowered for a train to start and it is found necessary to replace the signal to danger, the line to which the signal applied must not be obstructed nor must the points be reversed until the signaller is satisfied the driver has realized the situation.*
- V. *In the event of a train requiring to be run from one line to another or through a junction where it is necessary to reduce speed or such a route is that not normally booked for the train, the distant signal applicable to the line on which the train is approaching must be kept at caution and the home signal not taken off until the train has passed the distant signal. If a signal was defective but the locking in order, the man in charge of the work must disconnect the signal and the signaller must use the lever applicable to such signal to obtain the benefit of the locking. If it necessary for a train to pass a defective stop signal at danger before a hand- signaller has arrived and there are facing points or switch diamonds in advance of the signal one of two conditions must be fulfilled before the driver is authorized to pass the signal at danger. a. If the defective signal was in the rear of the box the signaller must be satisfied that the facing points or switch diamonds are set in the position over which the train is to run or b. If the defective signal is in advance of the box the driver must be stopped and the circumstances explained to him. He should be informed of the line over which he is to run and request him to see that the facing points or switch diamonds are set in position for that line before taking his train over them.*

Note that Clause V was amended from 16th December 1945 so that in such a situation, the home signal must not be taken off until the train was close to such signal. This amendment would be as a direct result of the Bourne End derailment on Sunday 30th September in that year.

9. Moving points irregularly.

Hints - This emphasized the need to take great care when operating points to ensure they are not reversed under a train and if at a junction and the signaller is not in a position to set up the route required for a train until it is closely approaching the stop signals at the diverging point, the points must not be moved unless the signaller is satisfied that as far as possible, having regard to the speed of the train, it is safe to do so.

10. Failing to carry out the appropriate rules and instructions when safety devices do not permit of the second working of levers or appliances.

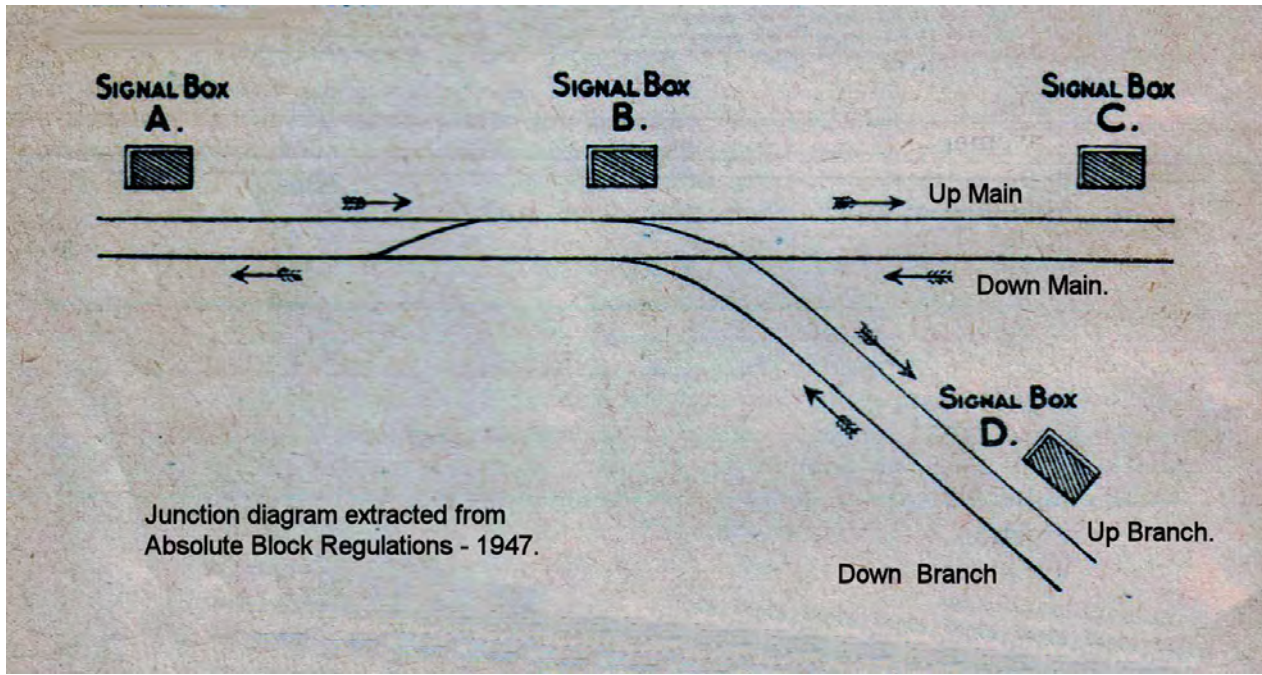
Hints – Safety devices such as track circuits, repeaters, rotary block, interlocking block, fouling bars, detectors etc were provided to help signallers discharge their duties efficiently, based on safety and punctuality in that order. If any of these devices do not permit the normal working of levers or appliances it must be assumed that they are carrying out their function, or in other words doing what they are supposed to do. There is then a need to make traffic movements only in accordance with the appropriate emergency rules and instructions

As an example, using Diagram 1.

The signaller at B decided there was just time, before an up express passenger train was due, to shunt a light engine standing on the up branch line on to the down main line via the up main and the crossover road, but as the junction facing points were set and

locked for C they were run through and badly damaged when the light engine was shunted. This fact escaped the notice of the signalman who quickly restored the

Diagram 1



crossover road points to the normal position, accepted the express passenger train from A, got it accepted by C and then tried to lower the up main line signals, but the detector at the damaged facing points held the up main line home signal at danger. The signalman however, thought the signal was faulty instead of assuming at once that the detector was functioning, and when the express was approaching he centred his attention on avoiding delay instead of thinking first of safety and the rules, hurried out of the box and exhibited a green hand signal to the driver. The driver unlike the signalman thought first of the rules, stopped the train, looked at the facing points, found the damage and the accident was avoided.

A second example, again using diagram 1.

In this case interlocking block was in operation between boxes B and A on the down line and consequently the down starting signal at B could only be lowered when the down line block indicator for A was at the Line Clear position; also the signal could be lowered once only for each time the block indicator was placed by A at the Line Clear position.

The signalman at B obtained a path for a passenger train from D to proceed to A over the down line and lowered the signals, but when the train passed B towards A the signalman omitted to give the "Train Entering Section" signal. He correctly restored the signals and points when the train had passed and then accepted another passenger train from C which required to proceed to A. When this train was approaching B on the down line the signals were at danger and the driver sounded his whistle. By this time the signalman had forgotten the first train from D, looked at his down line indicator for A, saw it was at the Line Clear position, concluded that A had accepted the train from C and tried to lower the down line signals for it to proceed. The down starting signal, of course, was held at danger as the only Line Clear release which had been given to A was for the train from D, and when B placed the starting signal to danger after this train had passed the Line Clear release was cancelled. The signalman at B, however, thought the signal had temporarily failed instead of at once assuming that the interlocking block device was functioning correctly, so he asked the signalman at A by telephone for another Line Clear release. This request was complied with irregularly by the signalman at A, with the result that the down starting signal at B was lowered for the train from C to proceed to A while the first train was still in the section and a serious collision occurred. There would not have been a collision if the signalman at B had carried out the appropriate instruction when he could

not lower the down starting signal, and authorised the driver to pass the signal at danger and proceed cautiously through the section prepared to stop short of any obstruction.

11. Want of care when conversing with other signalmen or staff either by speaking instrument or otherwise respecting the movement of trains or vehicles.

Hints - It appeared that accidents had been caused by misunderstandings between signalmen in the same box, or other signal boxes and between signalmen and other staff when talking about train and shunting movements. Communication between signalmen regarding train movements should be made using the block bells and not by using the telephone. When it is necessary to use the telephone for the block working of trains the signalman must first give the name of his box and to whom he is speaking and in all cases give a full description of the train about which enquiries are being made so that there is no risk of misunderstanding. Care to be exercised in all conversations between signalmen in the same box or with other staff regarding train or shunting movements with the full description of lines or trains concerned being given. Local terms were not to be used or slovenly expressions.

12. Allowing unauthorised persons to operate the block instruments and levers.

Hints -Signalman were reminded that such irregular working seriously put the safety of their colleagues and passengers at risk. Also it was forbidden to allow the signal box lad, porter or clerk to “take a hand”.

The booklet went on to say that in almost every accident there were two underlying causes.

- a. Failure to observe the appropriate regulations, instructions or rule.
- b. Lack of Watchfulness.

As far as b was concerned one in every four train accidents in the last five years (ie since the 1937 booklet) was due to an obstruction within the signalman's view being overlooked.

The booklet concludes by referring to two other Contributory Causes

1. Rule 39 (a) required that when a stop signal is at danger the next stop signal in the rear of it must not be lowered for an approaching train until the train is close to such signal and has been brought quite, or nearly, to a stand
2. Signalmen have contributed to accidents by failing to warn drivers as required by the Regulations when trains have been accepted by the box in advance under Regulation 5. (Regulation 5 dealt with “Section Clear but station or Junction Blocked [Warning arrangement”]).
3. Be prepared to carry Regulation 11, and remember that its value depends on you applying it as soon as an unusual time has elapsed between “Train Entering Section” signal and the time you should be able to determine the train is approaching. (Regulation 11 dealt “Train an unusually long time in section”).

Finally a warning was given to signalmen working on single lines worked under the Electric Token Block Regulations. This stated “take great care of your tokens and do not leave them lying about or you may deliver a wrong token to a driver. Hand them only to the authorised staff, and however sure you may feel that you have got the correct token, make a practice of seeing that it is the correct one immediately before you deliver it. Never allow a token to remain out of the instrument when you have received it after use even though it may be again required for shunting later on”.

Plate 2.



1957.

Landor Street Junction ex Midland Railway Signal box in 1957. The line in front of the box is the down line to New Street and the line behind the box is the Camp Hill line.

D. Ibbotson.

Plate 3.

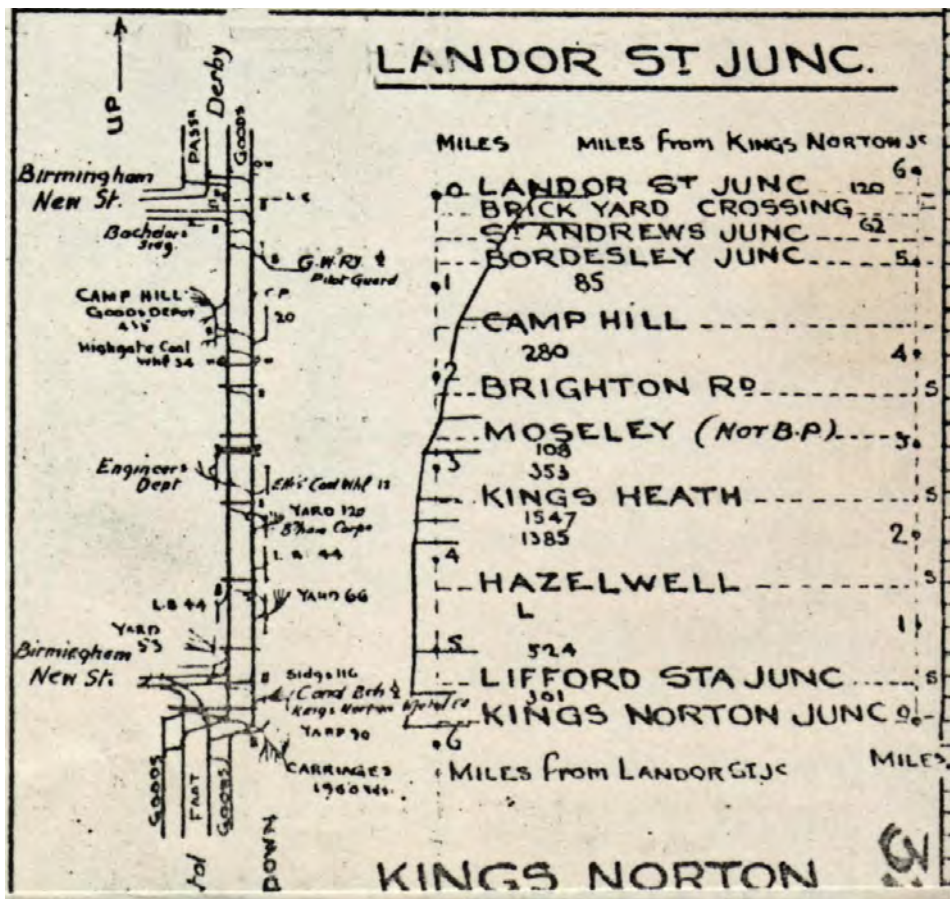


The Interior of Landor Street Signal Box in 1957.

D. Ibbotson.

Landor Street Junction Signal Box, Saltley, controlled the junction between ex-MR main line from Derby into Birmingham New Street and where the Camp Hill line began. The section to St. Andrews Junction was originally known as the Aston curve and this line allowed trains from the north to the west to bypass New Street station. Between Landor Street and the Brickyards Crossing, the next signal box on the Camp Hill line, the line passed beneath the ex LNWR line from Birmingham to London. The Up and Down Goods lines from Washwood Heath and Saltley continued into the Camp Hill line. The passenger lines required a double junction to allow passenger trains access to Camp Hill. (See diagram 2).

Diagram 2.



The c1935 LMS Line Diagram of Landor Street Junction and the Camp Hill line,

The box faced the Camp Hill lines, both pictures being taken in the same direction, with the Down camp Hill home signals (levers 22 & 24) right next to the box steps. It was continuously open until about 1953, then closed on Sundays thereafter. The layout, signal box and lever frame all date from 1896, but the signalling had been improved with the addition of a track circuit in rear of the Down Passenger home

signals in 1915, and further modernised in October 1938 with four more track circuits and block controls. This was part of a general scheme of introducing block controls on all of the company's main lines. "Warning Acceptance" (Reg.5) may have been authorised here, but details are not available. At the opposite extreme, the Camp Hill goods lines were operated by the MR system of "Telegraph Bells" until 1955, and then by the "no Block or Bell" system, ie by telephone only, with trains being cautioned before being allowed into the section when occupied. Cause 6 applied here. There were short block sections on all sides, with that to Brickyard Crossing on the Camp Hill line being a mere 352 yards (from signal box to signal box). That to Grand Junction was 924 yards and to Duddeston Road (in the Saltley direction) only 506 yards. Starting signals were provided on the Down New Street and Down Camp Hill lines but not in the Up direction. Each starting signal lever was electrically locked and released by "line clear" on the appropriate block instrument, as demonstrated by the white bands painted on lever 5 (behind the signalman's leg) and lever 8 (near his left hand).. There were probably also white bands on levers 24 and 27 for the Up home signals (out of shot). Track circuits in rear of each starting signal reminded the signalman of any train waiting there, as did track circuits in rear of each home signal. The indicators for these are round faced dials fixed on the block shelf. There was no track circuiting through the junction.

The predominant traffic flows were goods trains to/from Camp Hill but the line was used by passenger trains that were not booked to travel via new Street, these were generally excursions or specials travelling between the West and North of England and Passenger lines to/from New Street, in which case the junction points could be left in the normal position, as seen in the photo (levers 13, 14 ,15 &16). Also in the picture trap points 10 and 11 are reversed (closed), signals 1 ,2 & 5 are off (levers reversed) for a train from Down Goods to Camp Hill and 22 off for another train from Up Camp Hill to Up Goods. Under such conditions trains could be signalled independently on each of the four lines, and the signalman would have to remember not to accept a train on any line until it was clear to his clearing point (440 yards beyond the home signal). The block controls would, in some cases, prevent the signalman from giving “*out of section*” and accepting a train when there was already one in the section, but there were other traps that the signalman could fall into. Causes 1, 2 and 8 would always be relevant, and also 5, 10 & 11 at certain times.

When a train needed to cross from the Camp Hill lines to or from the passenger lines, other factors came into play. Before moving the points, the signalman would have to ensure that he did not infringe the clearing point for any other train that had already been accepted. If a train had been accepted on the Down Passenger or Up Camp Hill lines, facing points 13 or 16 (respectively) could be moved as long as the line was still clear for 440 yards on the line towards which the points were moved, and the train which had been accepted was either some way off, or could be seen to be approaching the home signal at danger with the train under control. Cause No. 3 was relevant here. Of course, reversing points 16 could potentially infringe the clearing point for any train that had already been accepted on the Down or Up passenger lines, as well as for the Up Camp Hill, and similarly for points 13. Experience, alertness and care were essential. As well as this, there was also the danger of turning the points underneath a train – cause No.9. So it can be seen that even at a small signal box a simple layout, most of the hints were entirely relevant.

Plate 4.



system until the late 1940s when the latter two lines from Brent Loaded Wagon Sidings were re-designated as Nos. 1 & 2 Up Departure lines, worked by “No Block or Bell”. The Up and Down Goods and the 2nd Up Goods to Watling Street Junction were worked by Permissive Block with LNWR pattern instruments from 1952 – two of these instruments can be seen nearest the camera in the picture. The introduction of permissive Block was itself the result of a nasty collision at Oakley Junction in October 1949 that discredited the “telegraph bell” system. The 2nd Down Goods from Cricklewood to Brent Empty Wagon Sidings, and from Watling Street to Cricklewood were worked by “no block or bell” regulations, these were each re-designated as Down Reception line c1953 and c1942 respectively. The line to the Empty Wagon Sidings, or “Linger” as it was known, was actually worked by bell, but the line from Watling Street was worked by telephone.

There were track circuits in rear of all four starting signals on the Fast and Local lines, dating from 1912 which may also have been the installation date of the Rotary Block. There were no track circuits in rear of the home signals, but the Rotary ensured the protection of train standing at them. Release of starting signals by “line clear” was an integral part of the “Rotary” system; the white bands on levers 72 and 75 can be seen, either side of the left hand pair of levers with black & white chevrons, 73 & 74, the fast lines detonator placers. Levers 47 & 51 for the local lines were similarly painted, but more difficult to see. The low level of traffic on the branch meant there was little scope for errors, despite the lack of track circuiting or block controls. In fact, in the picture lever 99, working the points from Down Branch to Down Yard was reversed, so the signalman was not expecting any trains on the Up or Down Branch; it was Saturday afternoon though! Additional Track Circuits on the Local lines were provided in August 1939, with another through the Down Local facing points plus two more on the Down branch in October 1943. Two more Track circuits through the junctions in the Fast lines were brought into use in September 1950 by which time the illuminated diagram was in use. All these safeguards gave added protection to standing trains, and also prevented the points concerned being turned underneath a train. There were still many points not yet protected by track circuits, though some of them were used very frequently. All the problems and potential for mistakes at Landor Street applied equally here, but there were also the added complications of shunting movements. In its heyday there would have been plenty of engine movements here also. This could not be done without conversations between signalmen, drivers, firemen and shunters as to what was required and when it could be done. Causes 3, 4 & 11 came into the picture here.

The amount of work involved in such a place depended to a large extent on whether the signalman at the surrounding boxes could be persuaded to transfer trains to the correct lines before they approached. Double-manning, and the “boy” filling in the Train Register meant the work load of each signalman could actually be less than at the adjacent boxes, but there were still a lot of block instruments and bells to be manipulated correctly.

Plate 5



*The interior of Bell Busk signal box with the signalman, Harry Blenkiron.
British Rail.*

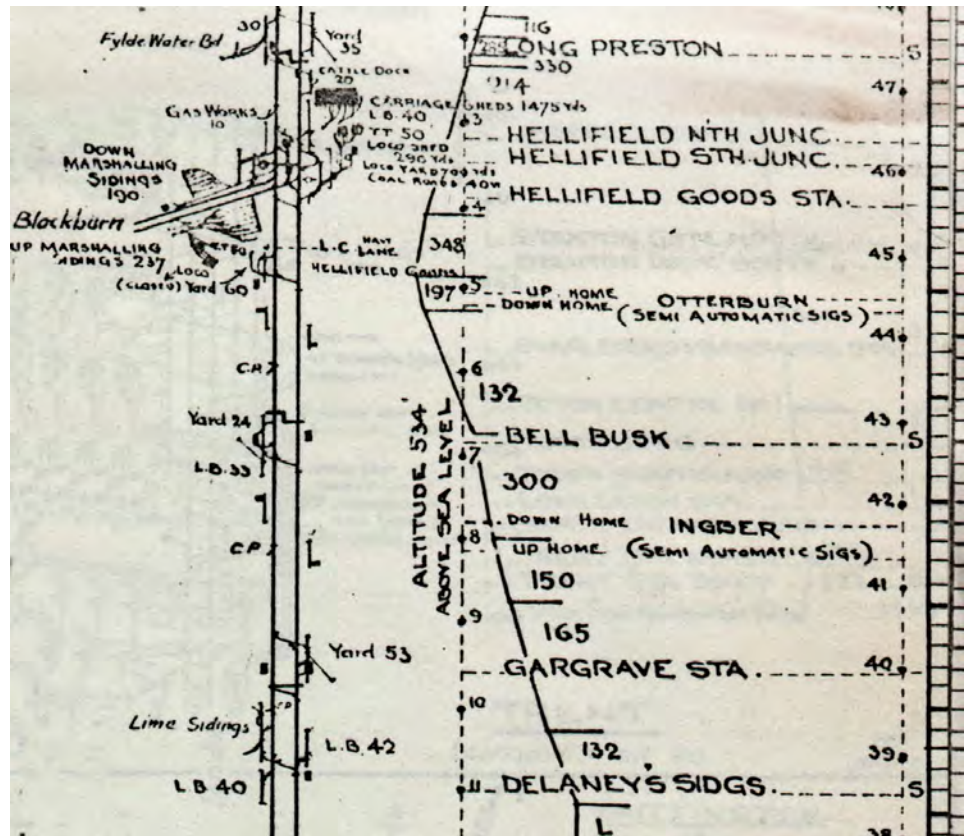
Bell Busk was a small box with a simple layout on the double track section between Skipton and Hellifield. The box dated from 1899 and the frame of 16 levers from 1909. (See diagram 4). What made Bell Busk unique, though, was that it had no block instruments as the sections on either side were worked by the MR

automatic signalling, installed in 1911. These were operated by track

Diagram 4.

The c1935 LMS Line Diagram showing the section between Cargrave and Hellifield Goods as referred to in the caption to plate 5.

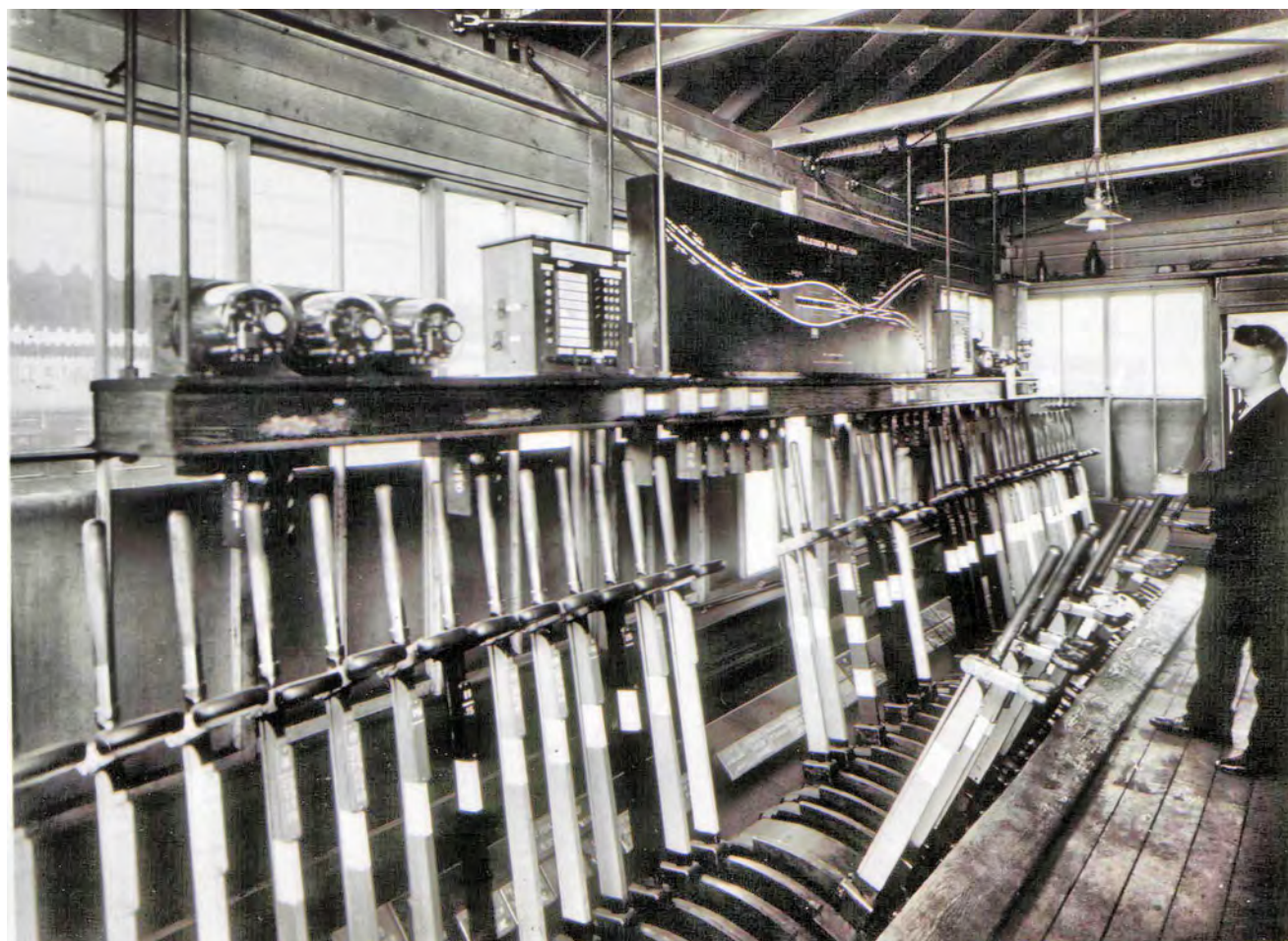
circuiting which is installed throughout. Trains were signalled from one box to the next by bell, as Signalman Blenkiron is demonstrating. The progress of trains was followed with the original apparatus, in wooden cases, the Up Line one of which is in front of him in the picture. These used



rotating flaps to indicate the state of each section, in this case the sections being Cargrave – Bell Busk – Hellifield Goods. For this reason the box was open continuously. (The black instrument to the left is a set of lamp repeaters).

Manually operated distant and home signals were provided at each signal box, together with motor operated semi automatic intermediate signals in each section. In the picture there are two short handled levers, 2 operating Ingber Down intermediate signal and 6 operating the down starter. Lever 4 & 5 operated the down distant and home mechanically. The full details of the system need not concern us here, but as originally installed it had certain weaknesses, including the lack of arm proving that could have the effect of allowing a semi automatic to clear towards a manual signal which had irregularly been left at clear when it should have protected a standing train. Exactly such a situation happened in December 1955 with Otterburn down signal; Hellifield Goods signal box had been abolished in October 1938 and replaced by an outer home signal for Hellifield South Junction, which signal was inadvertently left showing clear. One express ran into the rear of another just before 5am. (see "Obstruction Danger" A Vaughan, p100). The signalman at Bell Busk did not need to know the normal block signalling process, but did of course need to know the "emergency" regulations for dealing with obstruction of the line, disabled or divided train etc., insofar as was possible in the absence of block instruments. Special instructions were issued. The signalman would spend all their time on duty using bells and section instruments, which would become second nature to them, but they needed to be fully aware of the shortcomings of the system. Again causes 1, 2, 8 & 10 were highly relevant. The date of the picture is not known but was probably the late 60s or maybe just before the box was abolished, together with this historic signalling system, on 19th December 1971.

Plate 6.

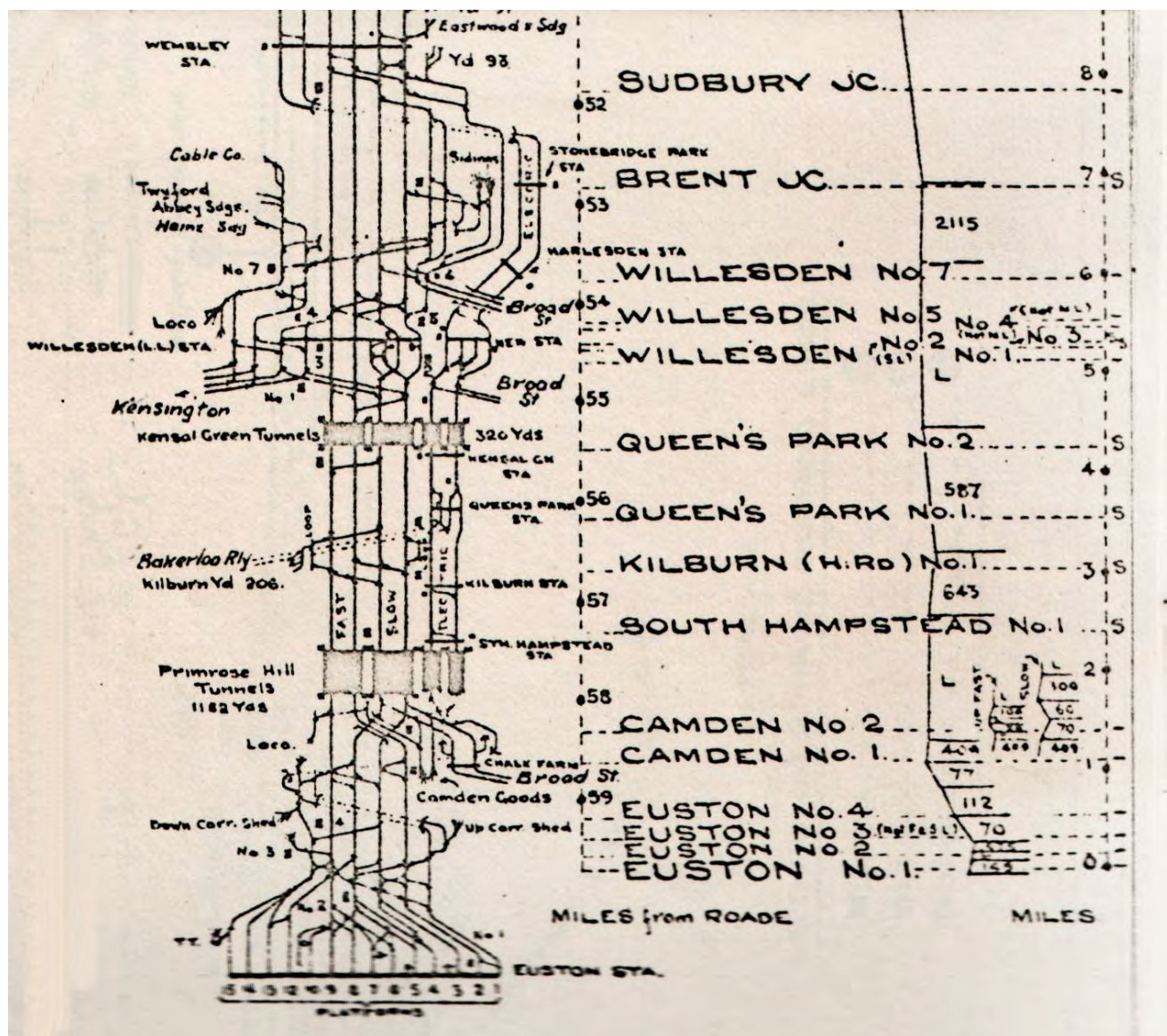


Willesden New Station Signal box.

. R. Anderson.

This box was on the DC electrified "New Line" from Camden to Harrow and opened in 1914, with a frame for 52 levers. When opened it controlled the double line by absolute block working to and from Kensal Green and Harlesden, and Kensal Green Junction on the curve connecting with the Hampstead Junction line. However this picture was taken soon after the line had been re-signalled in 1932 with Bound's system of colour light aspects, and the absolute block working had been replaced by continuous track circuiting with automatic and semi automatic signals and train describers. A full description of this scheme was published in LMS Journal No.27. The absence of block instruments is noticeable in the picture; the wooden box just on the nearside of the illuminated diagram is one of the train describers of the "magazine" type. One block instrument was retained, however, for the Absolute Block section to Kensal Green Junction on the curved line; this is just visible at the far end of the block shelf. The course of the curved line is visible at the top right of the illuminated diagram. Most if not all the levers are painted with a white band, which in this case means released by track circuits. This includes the point levers (black) 11, 15, 26, 27, 32 to 35, 48 and 49. There was a very frequent train service, LMS from Euston and from Broad Street via Camden, and LT Bakerloo Line via Queens Park to Harrow and Watford. These services passed through the station on the Up and Down lines which required signals 18, 19 & 20 and 29, 30 & 31 to be cleared. These levers are reversed in the picture, and it seems likely that they stood in that position most of the time, being replaced to danger and cleared again after each train.

Diagram 5.



LMS Line diagram of Willesden, to be read in conjunction with the caption to plate 6.

The curve was used mainly for empty trains to and from Mitre Bridge car sheds, which reversed at Kensal Green Junction; many of these used one of the bay lines to await their next working. These moves took place before and after the morning and evening peaks, and for the rest of the day the work could be dull, tedious and repetitive. There were occasional movements of empty stock between Mitre Bridge and Stonebridge Park shops, and of LT vehicles to or from Lillie Bridge or Acton Woks. The pattern of the timetable was changed from time to time, and there may have been times when through services from Broad Street via the Hampstead Junction Railway came down the curve, or when passenger trains were regularly terminated in the bay platforms. Both of these were regular features between 1914 and 1925, but are not known to have occurred between 1925 and 1950.

This installation, modern and impressive though it might look, was actually switched out for large parts of the day. With the signal levers for Up and Down lines reversed (as above), the closing lever or "King lever", no.24 with brown and white stripes, was pulled over and the signals worked automatically. Two Class 2 signalman's positions were abolished as a result of the 1932 re-signalling and replaced by porter/signalmen, and an existing porter/signalman downgraded. In 1930, when absolute Block was still in force, the box was open each weekday from 4.45am to 12.45am but in 1942 and 1946 it is listed as "open only in emergency". It seems likely that the porter/signalman opened the box several times a day to

allow access for empty electric trains, a WTT for the period is not readily available. When opening the box, he would have to take great care not to place any signal to danger in front of an approaching train. Clause no.7 was the important one here, although that specifically refers to Absolute Block Regulation 24 that did not apply here, at least not in its entirety. The duties of the porter/signalman here, when working in the box, were similar in some ways to those at Bell Busk, but there were important differences. The equipment was considerably more modern and more reliable, and there was the added complication of a junction and bay lines.

In the BR period the box once again became regularly staffed. The running signals were worked by a IFS panel at the left hand end from 1977, with a shortened lever frame to work the points and ground signals, but this only lasted for eleven years as the box was abolished in December 1988 in a wider re-signalling of the whole DC line.

Plate 7



The interior of Euston No. 2 Signal Box.

British Rail 16952/3

Mechanical signalling par excellence! The largest signal box on the LNWR was appropriately at their Euston terminus. No.2 was the principal box controlling the station, the double-width box structure opened in April 1891 and containing a tappet frame, in two rows each of 144 levers, dating from March 1906 when the approaches were widened and re-signalled. Euston Nos. 3 and 4 boxes were also new at that date, both containing "Crewe" all-electric frames. No.3 controlled the down side backing out roads as well as the engine and carriage lines on the up side, between bridge 5 and bridge 6 (Mornington Crescent), and No.4 the connections at the Camden end, north of bridge 6 and the engine and carriage lines underpass. No. 1

was a small box above the arrival side platforms controlling only the engine release crossovers and associated signals.

In the photo the Arrival side frame is on the left, controlling platforms 1 to 5, and the Departure side frame, levers 145 to 288 numbered from right to left is on the right. (The reversal of usual numbering was the result of the replacement of the original frames in 1906, which were in the centre of the box.). It is not possible here to even summarise the functions of the levers and other equipment visible, except to say that the down fast starting and shunt ahead signals were worked by levers 179 & 182, while the platform starting and shunt signals (platforms 6 to 15) were mainly at the far end in the range 203 to 205, 252 to 288. No white band is apparent on any lever!

All four boxes at Euston were open continuously, and it is believed that on the day shifts at No.2 there were four signalmen, two each on the arrival side and departure side frames. In the 1930s this box must have dealt with several hundred trains each day, including empty carriage workings to and from Willesden and engines to and from Camden. As main line arrivals and departures were dealt with separately on different sides of the station, each arrived train had to be shunted out from the platform, and either re-marshalled for a later departure or taken away to the carriage sidings. Engines would have to be dealt with separately. Many local trains, on the other hand, arrived and departed from the same platform, with a fresh engine on the front. Parcel vans were also dealt with. Consequently shunting, attaching and detaching were going on virtually all the time. The layout was complicated in order to enable moves between the Fast, Slow, Engine and Empty Carriage lines and all platforms in a highly restricted space; pulling the right point and FPL levers to set up the required route for each move was something that had to be learnt by each signalman. The absence of track circuits meant that great care had to be taken to ensure that the correct levers were pulled, and only when movements were clear of them. The view from the box of shunting movements was restricted by the immediately adjacent over bridges; for this reason the operating floor was only a few feet above rail level (and most of the interlocking was in a pit beneath). Communication with train crew and shunters was an essential part of operations. The nature of the work was significantly different from any other box on the system, and the signalmen were highly skilled, experienced and knowledgeable.

The layout at Euston by the 1930s was very cramped and difficult to operate, and the platforms too short for modern trains. Long trains stood ahead of the platform starting signals and fouled the connections to and from adjacent platforms. The pitfalls of working at such a place are illustrated by a serious collision that occurred on the evening of 10th November 1937. The thirteen coaches of the 11.45pm to Glasgow Central were standing in platform 13 and one of the Departure Side signalmen was waiting for the engine to arrive from Camden. When he received a bell signal 2 pause 3 (*light engine*) he accordingly set the road and pulled off for it to go into platform 15. Unfortunately the bell signal was not 2-3 but 2-2-1 (*empty coaching stock*) for the thirteen coaches of the 12.40am to Glasgow St. Enoch, intended for platform 13. The incoming empty coach train collided heavily with the standing coaches in platform 15 and the damage was extensive. Being a late evening in November it was totally dark apart from meagre yard lighting, and it is doubtful whether anyone involved could see what was about to happen until the last minute. Apart from the obvious need to ring bells clearly and distinctly, if track circuits had been provided, the signalman might have noticed the incoming movement was longer than just an engine and put a red lamp out of the window. The accident report is worth reading and it was also reported in the railway press.

The LMSR had planned a thorough rebuilding of the terminus at that time, under the Government Loan Scheme of 1935, and got as far as a ceremonial detonation of building stone in Shap Quarry, but cancelled further work on the outbreak of war. The company put forward a revised scheme estimated at £2.78m in 1945, but in the post-war financial climate, the full scheme could no longer be afforded, and it was deferred in January 1948, so that

most of the existing platforms and buildings had to remain. Because of the agreement that the LMS and the government had entered into in 1935, the permission of the Minister of Transport had to be obtained in order to release the LMS from its obligation, but the national situation at the time made this inevitable. However, not only was the signalling equipment life expired but platform lengthening was deemed essential, and so a much reduced plan catered for extensions to 1 to 3, 6, 7 and 12 to 15. To enable this to go ahead bridge 3 (the southern of the two Amptill Square over bridges) was to be removed, and the up side track layout completely remodelled, with most of the slip points and diamond crossings removed and a ladder of new connections on the Camden side of bridge 5 (Hampstead Road over-bridge). The alterations on the down side were not so extensive. The remodelled layout was to be controlled from a new miniature lever signal box.

To further emphasise the out-datedness of the existing working methods, and the need for modernisation, another serious collision occurred in departure platform 13 on 6th August 1949. The departure platforms were not track circuited, and the only indication of platform occupancy in No.2 signal box was chalked details on a slate. As a result of a misunderstanding, a full train of empty stock was propelled into platform 13, which was already partially occupied, instead of no.12. A good example of cause no.11. Very little alteration had been made to the signalling since it was installed, but colour-light Up Home signals, Down Fast and Down Slow starting signals were in use by 1946, as an extension of the 1943 Camden - Willesden colour-light signalling. Probably as a result of this accident, a limited amount of track circuiting was authorised by the Railway Executive on 20th October (minute 3202) and brought into use on platforms 12, 13 and 14 and the Down Fast Line on 1st January 1950 (TCs 11221-28). It was stated at the time that this was considered to be the first stage of a complete modernisation of the signalling.

At the time of the accident the new layout and signalling were already under discussion by the London Midland Region officers, with the revised proposals probably adopted by the Railway Executive in 1950. Shortly afterwards, in February 1951, the scheme was approved by the British Transport Commission, the estimated cost being £331,616. The final signalling plan for the new box was no. NW50006, dated 1950 and the order number was 7837; work on the ground probably began in early 1951. At about the same time plan NW 50001 was issued for the urgent renewal of the starting signals from platforms 4 to 9 as colour light signals on roughly the same sites, and still worked from No.2 box; these must have been so decayed that renewal could not wait until 1952. The sighting committee met on the 25th and 26th of January 1950, and the new (temporary) colour-light signals were probably in use by the end of that year. These and other similar signals account for the large number of short-handled levers. By the time this photograph was taken on 16th September 1952 the new signal box was virtually complete, bridge 3 had been demolished, and the old box had less than three weeks of work left. No doubt the signalmen were apprehensive about how they would adjust to the new system.

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