## General Meeting of the Institution
HELD AT
## The Institution of Electrical Engineers,
## Wednesday, March 13th, 1935.

The President (Mr. H. E. MORGAN) in the Chair.

**The President**, in opening the Proceedings, said that he would like to express his appreciation of the honour of presiding over that meeting. He only hoped that he would be able to carry out the office in as efficient a manner as his predecessor and to the satisfaction of the Members.

The minutes of the last—the Annual General—Meeting were read and confirmed. Two questions arising out of the minutes were then dealt with by the President. The first was that mentioned by Mr. Addis as to the clashing of their meetings with those of the Permanent Way Institution. The matter had been discussed by the Council that afternoon and as their meetings always were held on the second Wednesday in each month and as the Institution's programme for the present Session was arranged before the Permanent Way Institution fixed their list it was for the latter to take action. The intended programme for next Session would be sent to that Institution in good time in order to avoid such a position arising again. The other matter mentioned in the minutes was the point raised by Mr. Austin; that was receiving the consideration of the Council.

Mr J. Wright, a Member present for the first time, was introduced to the meeting.

**The President**, having announced that the Summer Meeting had been fixed for from June 21st to 25th inclusive, said that the business that night was to consider the Paper:—

# The Nomenclature of Interlocking Signals.

By F. B. EGGINTON (Associate Member).

(*Inset Sheets Nos.* 1-3).

Those of us who have had our attention engaged during the last few years with Colour-Light Signalling and its manifold problems and developments, are perhaps apt to overlook the

fact that semaphore signalling also still has its problems and its, as yet, unsolved controversial points. Probably the most important of these, and one which is equally important where colour-light signals at interlockings are concerned, is the question of the most suitable naming for signals.

Ten to fifteen years ago, the nomenclature of signals in an interlocking area, presented, in the majority of cases, few, if any, difficulties. A given set of names was adaptable to most conditions met with, three or at most four consecutive stop signals worked from one box being the order of the day.

With the introduction of the remote control of points by electric machines, however, interlockings tended to become much more extended. During the last ten years or so, strenuous efforts on the part of all railway companies for economy in operation, together with increased efficiency, have led to the elimination of large numbers of signal-boxes by the use of remotely controlled points. In all such cases the number of consecutive stop signals operated from one cabin has been increased. Moreover, in new works and extensions of existing works, the same feature has led to a considerable increase in the area controlled from one cabin, rather than the provision of the additional cabins which would have been considered necessary in the past.

In general, therefore, the interlocking area of modern installations is considerably larger than in days gone by, and the number of consecutive stop signals operated from one box has increased from three or four to as many as six or even seven.

To find suitable and consistent names for all these signals has been a somewhat vexed question. In the early days of amalgamations of signal-boxes, cases were treated individually and the resulting names and their order were often, probably, purely a matter of opinion. Different cases prepared by different individuals in the same organisation, perhaps, bore little or no similarity in the order of the names selected. There were no rules covering the order of the names, sometimes not even the names themselves. Later on it became apparent that some attempt at order must be attained, but this presented difficulties.

In the first place, each of the railways was composed of a number of constituent companies, all with possibly varying practices. The signalling staff was similarly composed of individuals from different companies, having different views on the subject and consequently unanimity was difficult to obtain. The

Operating Officers, too, were not always in agreement with the proposals of the Signal Engineer.

Consequently to-day, although some measure of uniformity must obviously have been obtained, there are still no rules to cover the nomenclature of interlocking signals.

This Paper is put forward, not as an attempt to solve in itself this still controversial question, but as a serious basis for discussion, from which might be evolved a set of rules suitable for general application. Even with such a set of rules, there would of course still be exceptional cases demanding special consideration, but, unfortunately, there are very few rules without their exception.

The suggested rules here advanced cover, as far as possible, in a consistent and uniform manner, the majority of cases met with, without departing greatly from hitherto accustomed practice.

They are the result of observations made over a considerable period, both as onlooker at, and participant in, many arguments over problems which at times seemed incapable of a reasonable and consistent solution. Actually, they sum up what has gradually become the practice on the particular area of the railway served by the Author. The rules suggested, in their order of consideration, are then as follows :—

(1)—*Home Signal.*—That stop signal which immediately protects the first fouling point approaching an interlocking.

(2)—*Starting Signal.*—If there is only one stop signal ahead of the home signal it shall always be the starting signal, irrespective of its position.

Where there is more than one stop signal ahead of the home, the last signal protecting points shall be the starting signal, except as referred to in Rule 6*b*.

(3)—*Outer Home Signal.*—A signal placed outside a home signal purely for acceptance purposes. That is, a signal approaching an interlocking, having a length of clear track or its equivalent, between itself and the home signal, equal in length to the customary block overlap.

(4)—*Inner Home Signal.*—A signal placed inside the home signal, assuming that where there is only one stop signal ahead of the home, it shall always be the starter in accordance with Rule 2.

(5)—*Intermediate Home Signal.*—The name to be given to a signal situated between the home and the inner home, where such additional signal is required.

(6)—(*a*) *Advanced Starting Signal.*—The name to be applied to a signal, not less than 400 yards beyond the cabin, and beyond the starting signal. Thus an advanced starter where provided, must be beyond the furthermost points of the interlocking.

(*b*) Where there is more than one stop signal ahead of the home, and the last signal, although ahead of the furthermost points, is less than 400 yards from the cabin, such signal shall be called the starting signal, and the signal next in rear, protecting the points shall become the inner home.

(7)—*Intermediate Starter.*—Name to be applied to a signal situated between the inner home and the starting signals where such additional signal is required.

These seven rules cover the provision of seven consecutive stop signals operated from one box, and for the present, at any rate, this can be regarded generally as the maximum. As will be seen, the actual names used do not depart from tradition and this cours has much to commend it.

It is not the aim of this Paper to suggest any alteration to established nomenclature, but merely to attempt to justify the retention of the existing names and to suggest certain rules which will give a consistent answer to the question " What should this signal be called ? "

Adherence to these names of established usage overcomes a number of difficulties. For one thing, they are used in the Railway Companies' Rule Book, which would require revision if new names were introduced. Further, they are well known to, and recognised by, all grades in the railway service. The introduction of new names would call for intensive re-education of a large part of the staff, such as drivers and signalmen, apart from the signal engineering and allied departments.

Actually there are three courses open in a search for suitable names for interlocking signals. The first is to adhere to all the names hitherto in use and adopt variants of these as necessary. This implies the use of Home, Starting and Advanced Starting signals as basic names, and is the course here adopted.

There is, however, a school of thought which objects to the term advanced starter and this gives rise to the second course of using home and starter only as basic names. The third course open is to adopt some entirely new names in addition to whatever basic names are retained. Considering these in a little more detail, we will deal with methods two and three first.

If home and starter are to be used as the basic names and variants added, it follows almost axiomatically, that signals falling between the home and starting signals, and these may number as many as four in extreme cases, will become known as, first, second, and third intermediate home or stop signals. This, although presenting simplicity in one respect, and moreover lending itself to future expansion, appears to be somewhat cumbersome. It is in addition liable to misunderstanding, especially when verbal messages are considered, as the only variation is the numeral which might be imperfectly heard and therefore misinterpreted.

The third course of adopting entirely new names for certain signals can, at any rate partially, be applied to either of the first two courses.

A lead in this respect was offered by Messrs. Rickett and Wagenrieder in their Paper " The Railway Rule Book and its Relation to Signalling," read on May 9th, 1934.*

In the course of that Paper, two suggestions for new names were put forward, both of which however are intended to replace existing names and do not therefore assist greatly in providing new names for additional signals.

The first suggestion made was to replace the term " outer home " by " block acceptance " signal. There is a good deal to be said for such a change, as it is often difficult to decide whether a signal actually falls into the category of " outer home ". An example is the case of an ordinary converging junction where the home signals have been moved back (often in the course of amalgamation of boxes) sufficiently far from the fouling point, to give simultaneous acceptance on both routes, but where no inner signal has been provided on either route. Are such signals outer homes or merely home signals ? They are quite definitely " block acceptance " signals.

A similar case and one on which comment is invited, is that of an ordinary through interlocking, with an infrequently used crossover or other connection between the first and second stop signals, these being sufficiently far apart for acceptance purposes for following movements, if the connection be ignored. In such a case is the first signal a "home," in that it protects the connection, or an " outer home " in that it is used for acceptance purposes

*Proceedings 1934-35. Part I., page 119.

for following trains? Again, it is quite definitely a " block acceptance " signal.

The use of this name (were it adopted) would presumably, in dubious cases, rest with the Operating Department's definition as to whether the particular signal could or could not be used for acceptance purposes.

The main objection would come with little doubt from the Locomotive Running Department, who would probably maintain that this new name or any new name for that matter, would convey little or nothing to their drivers.

The other suggestion put forward was the substitution of the term " section signal " for starter or advanced starter, where the latter exists.

From a signalling point of view, at any rate, there appears to be little gain from such a change and again the driver's point of view influences the question. Without doubt, however, this change would simplify the rules concerning starting and advanced starting signals.

Altogether, proposals of this character cannot be lightly discarded and the desirability of changing some of the accepted names should receive consideration in any future deliberations on this subject.

Referring again to the Paper of May 9th, 1934, it is admitted that " the most difficult point to settle is what to call the stop signals between the outer home and section signals." It is the difficulty of finding *new* names for such signals that influences one to return finally to the first method of using home, starting, and advanced starting signals as the basic names.

Let us then consider these names and the order of their application :—

(1)—*Home Signal.*—The minimum requirements for a block post are of course a home and a distant. It will generally be conceded therefore that the home signal should be the signal immediately protecting the first fouling point. The point to be emphasised, however, is that it should always be the *home* signal, whatever the other conditions obtaining in the interlocking area. It is obviously desirable to maintain the same name for signals in similar positions so far as that is practicable. In the past, when an outer home signal was provided, what had hitherto been the home signal became the inner home. One thus had the position of two signals immediately protecting a junction, the

one on the main being the inner home, while the signal opposite to it was the branch home. The " inner " should be dropped in such cases and both signals remain as home signals.

(2)—*Starting Signal.*—Having decided the home signal in any particular interlocking, which presents no difficulty, the next signal to consider is the starting signal, as a decision on this influences the names of most of the other signals. This, therefore, forms the subject of the proposed Rule 2. Referring to this rule, it will be seen that it states " If there is only one stop signal ahead of the home signal it shall always be the starting signal, irrespective of its position." This is almost axiomatic, but it may be too rigid. Cases do arise, particularly on four lines of way, where there are more interlocking running signals on one line than on the other line in the same direction. In such cases, in order to keep opposite signals of the same name, it may be necessary to depart from this rule. Diagram 1 illustrates this. It will be seen that on the through line the starter is the third signal, while on the local line, as there is only one stop signal inside the home it should be the starter. If this were so, the name would conflict with the through line signals opposite. Moreover, the local to through starter would lead up to the through starter, an undesirable condition. The alternative shown in the diagram is to be preferred.

However, as stated earlier, there are few rules without their exception, and in any case rules should be intelligently applied. The first part of Rule 2 can therefore safely stand.

The second portion however, may meet with some opposition. It appears very desirable that the name starter should be applied to the last signal protecting points, *however far it may be from the cabin and irrespective of whether there is another signal ahead or not.* In the majority of such cases there is almost bound to be a companion signal leading through the connection protected and this would inevitably be termed starter, whether from goods or loop, or slow line, or yard. In the interests of uniformity therefore, the main signal should be the starter. Diagram 1 illustrates this also. An exception is laid down in the proposed Rule 2 which refers to Rule 6*b* and the exception is best considered at that stage.

(3)—*Outer Home Signal.*—The proposed Rule is self-explanatory and is in accordance with generally accepted practice. No further comments are therefore necessary, except to refer back

to the suggestion for an alternative name, which might simplify doubtful cases.

(4)—*Inner Home Signal.*—The proposed Rule, referring as it does to an inner home signal as one placed *inside* the home signal, is somewhat at variance with what was formerly the practice, as instanced under the heading of home signal. It has, however, already become fairly general practice and having once accepted the unvarying name home signal as the basic interlocking signal, the use of inner home to describe a signal inside the home becomes perfectly logical and legitimate.

(5)—*Intermediate Home Signal.*—This variation of a name formerly existing has already passed into usage and appears more sound than any possible new name, providing the position of such a signal can be clearly defined. There seems to have been some doubt as to which side of the inner home an intermediate home should stand, but with the possibility of yet another signal between the home and the starter, its position between the home and the inner home as laid down in the proposed Rule 5 seems reasonable and should meet with general approval.

(6)—*Advanced Starting Signal.*—As mentioned earlier in this Paper, there is a school of thought in the signalling world, which at least discourages the use of advanced starter as a signal name, maintaining that the last signal of an interlocking should always be the starter. As however the elimination of this name limits the number of established names available, the choice of suitable names for the intermediate signals becomes more difficult.

It is necessary to qualify "home" signal by the prefixed "outer" or "inner" so there does not seem to be any grave objection to a similar qualification of the term "starter." In point of fact there was until recently an old interlocking possessed of an inner and outer advanced starter.

Further, the term advanced starter has the authority of the Railway Companies' General Rule Book and thus has the advantage of well established usage.

The substitution of a new name such as "section signal" for the last signal of an interlocking, although obviously very convenient, would lead almost inevitably to the elimination of both starter and advance and thus bring us back once again to the problem of suitable names for intermediate signals.

Accepting then, at least for the time being, advanced starter as a suitable name we have next to define it. Actually it is

easier to define what is not an advanced starter, rather than what is.

However, taking for granted the definition in the proposed Rule 2, that the starting signal is the last signal protecting points, it follows that the advanced starter, where provided, must be beyond the furthermost trailing points of the interlocking. It does not necessarily follow that a signal in that position becomes the advance. Whether or not that name is applied is dependent upon the number of signals to the rear and the actual position of the signal itself in relation to the box.

Thus, if there were only one signal to the rear, that is the home signal, the one under consideration would become the starter, irrespective of its relation to points or cabin.

It will be seen therefore that, except as referred to in the proposed Rule 6*b*, in determining the names of signals at any given interlocking, it becomes necessary to fix, first the home then the starter, as the remainder of the names hinge entirely upon these two.

As far as the exception is concerned, it will be seen that an advanced starter should not be less than 400 yards beyond the cabin. Now this statement has more of a psychological basis than anything else. Already we have become accustomed to starters at considerable distances from the box. The mere name advanced starter, however, implies a signal at some distance from the box so that the converse becomes, at least psychologically, unsuitable. It then becomes necessary to define at what point, other factors being equal, a signal acquires the status of advanced starter.

Four hundred yards from the cabin is a purely arbitrary distance, but is suggested because up to this distance track-circuiting is not generally considered necessary, while if the last signal of an interlocking is over 400 yards away, track-circuit should be provided to the rear of it, except under favourable conditions.

If then the last signal of an interlocking, although ahead of the furthermost points, is less than 400 yards from the cabin, the term advance is undesirable and such a signal becomes the starter. This reacts on signals to the rear and section (*b*) of the proposed Rule 6 is designed to cover this condition so far as the names of these rear signals are concerned. It will again be seen how desirable it is to determine as early as possible, the starting

signal in any interlocking, as this affects the names of most of the other signals.

Up to this point six consecutive stop signals operated from one box have been allowed for and this covers the majority of cases met with. It sometimes occurs, however, that there are three stop signals between the home and starting signals and only two of these are provided for.

The proposed Rule (7) suggests intermediate starter as a suitable name and defines the position of such a signal as between the inner home and starter. It will be seen also that in addition to furnishing a seventh name, it provides (with 5 or 6 stop signals) a suitable alternative to the use of intermediate home. The use of the latter may, in certain geographical conditions, have the effect of bringing the inner home unreasonably far beyond the box. Diagram 3, Figs 5*c* and 6*b* illustrate this point.

Having regard to the hitherto accepted meanings of the names as formerly used, those suggested in the seven rules imply to a large extent their position in an interlocking, once the home signal is determined.

The conditions obtaining at large terminal interlockings present special difficulties and require special investigation. There is nothing unusual about the signals approaching a terminal and it is only the departure signals which give rise to difficulty. In the majority of cases, of course, the cabin at a terminal is in the station yard and it does not seem correct to designate any of the departure signals as home signals. This leaves starter, intermediate starter and advance to cover all such signals. This is sufficient for most cases, but with the extensive layouts associated with modern power interlockings, more than three signals may occur. Particularly is this the case with colour-light signalling, where probably more signals are necessary in the interlocking area to cover close headway of trains. Diagram 2 illustrates such a problem which will be familiar to certain members of the Institution. No attempt is made here to suggest a suitable set of names for cases of this description, as it will probably be found that the solution lies in the application of local geographical namings.

Reverting to the names proposed for ordinary through interlockings, it will be realised that there will be a number of possible combinations of these according to the local conditions

in each individual case. Diagram 3 is a comprehensive illustration of these combinations.

The set of Rules here propounded will be found to meet the conditions for all straight-road interlockings, although as pointed out earlier, a modicum of imagination is necessary when dealing with more than two roads.

In dealing with triangles, however, and out-of-the-ordinary layouts, difficulty is sometimes experienced in getting the names consistent, when there are more signals on one line than on another. Diagram 4 shows a case of a triangle where the names fit in, each pair of signals being consistently named. Diagram 5 gives a typical power-worked junction where once again the names fit in. Diagram 6 is an actual case where consistent names have been suggested for all signals, although these are not entirely the actual names used.

Diagram 7 is another actual but very unusual layout, which would defy most Rules unless a geographical addition is made to the names, such as treating the West Junction signals independently from the North Junction signals, although worked from the same box.

So far as the use of signal names as between train crews and signalmen is concerned, there is another avenue deserving of exploration. With colour-light interlocking signals it is the practice to label each signal with its controlling lever number and a prefixed initial letter to indicate the controlling cabin. This combination of letter and number is used in communication between drivers and signalmen. An extension of this principle to semaphore stop signals would remove the possibility of misunderstanding in verbal messages regarding the position of trains, etc. It does not, however, completely remove the necessity of providing signal names in addition.

In conclusion, the Author wishes to add the following remarks. The material for this Paper was prepared as long ago as December, 1931, as a result of some discussions with which he was concerned. When then the paper given in May, 1934, by Messrs. Rickett and Wagenrieder, raised before this Institution the vexed question of signal nomenclature, it seemed an opportune moment to revive the old notes. And now that this subject has again been brought forward, the Author has the temerity to hope that the whole question will be investigated by this Institution as representing the signalling profession of the whole country.

That the desire for such an investigation exists is well established and should anything further mature, certain questions outside the scope of this Paper, such as intermediate block signals and standard labelling for automatics could well be included in the deliberations.

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## DISCUSSION.

**The President** said that the Paper came at a very opportune time because now that the Rules and Regulations Committee had completed their work it became very necessary to define proper names for signals in order to make certain that the rules were not misplaced. He believed that the British Standards Sub-Committee had used the following terms :—

| | |
|---|---|
| Distant signals ... ... | Giving advanced information to the driver of one or more fixed signals. |
| Home signal ... ... | Fixed signal or signals reached after passing the Distant. |
| Inner Home signal ... | Fixed signal. |
| Starting signal ... ... | Fixed signal controlling section ahead. |
| Intermediate Home signal | Fixed signal between the Outer and Inner Home signal. |

The terms had not been definitely adopted, therefore they could only be regarded as suggestions. No doubt there were many members anxious to take part in the discussion, so he would ask Mr. Downes to open it.

**Mr. F. Downes** said that it was not his intention to take part in the discussion that evening, but as the Author was a member of the L. & N.E. staff he was asked by the Council to open the discussion.

The Author deserved a very hearty vote of thanks for his excellent Paper. He had given a very lucid explanation of the difficulties which were known to most of them. The B.S.I. definitions mentioned by the President were quite good but were not sufficiently brief to introduce on lever labels, nor for reference in correspondence and reports.

Taking two existing names " Starting " or " Section " signal, for a signal controlling a train entering a block section, either of these was expressive for such a signal. Having passed the " Section " signal and the Distant applying to his approach to a

complicated area, the driver of a train had to pay attention to a succession of stop signals, that brought them to fig. 7 in diagram 3. In that there were, for the same road, seven signals shown as governing the running of the train, also controlling local movements within the forward interlocking area. It would be unwieldly to quote the nomenclature adopted on the diagram and would not give definite information as to exact position of any signal in relation to the others. If names were preferred he suggested that "Distant," "Acceptance Home" and "Arrival Home," "Starter" and "Advance" be used. Where additional stop signals were required suitable names became cumbersome and he suggested that numbers be applied as follows: Advance 1, Stop 2, 3, 4, 5, etc., the Distant being also named and bearing the highest number in the block section concerned, all being prefixed U or D for up and down respectively, similar to what applied with automatic signals. Such a method would give useful information as to number and position of the signals in interlocking areas.

He had pleasure in opening the discussion and as there were a number of Operating Officers present a hearty welcome was extended to them to take part in the discussion.

**Mr. B. F. Wagenrieder** thought that the Paper must certainly be regarded as a logical attempt to bring order to an unsatisfactory state of affairs, and it reflected great credit on the Author, who must have spent considerable time on his subject. Unless they ignored traditional naming, it was difficult to differ greatly from the Author so far as names were concerned, but, at the same time, the proposed rules were rather complicated.

The Author said at the foot of page 40 that naming was dependent on the number of signals, and the order of naming proposed was (1) Outer Home, (2) Home, (3) Intermediate Home, (4) Inner Home, (5) Intermediate Starter, (6) Starter, (7) Advance; one must define Home and Starter at the beginning, which was a point of view quite practicable to Signal Engineers, but hardly as suitable for trainmen.

Dealing with the Author's suggested rules:—*Rule No.* 1—What was a Stop signal, protecting a platform, to be called, where the first fouling point was at the departure end of the platform? Rule 1 did not seem to cover that.

*Rule No.* 2—*Re Starting signals.* There was a rule in the rule book preventing a train going up to the Advanced Starting signal during fog unless a track circuit was provided (39) (b),

which rule was based on the assumption that an Advance was some considerable distance—say 400 yards or more—from the signal-box. If Signal Engineers called such signals "Starting" that rule did not apply. The rule could possibly be altered, but, as the rule book stood, such signals to-day should be called "Advanced Starting."

*Rule No. 3—Re Outer Home signals.* Trouble arose in this connection with a Home signal placed sufficiently far out for acceptance purposes, but also covering a siding connection. There were also Home signals fixed at 500 yards from a box at a splitting point, thus becoming junction signals so far as their purpose was concerned. The real point which it seemed necessary to define more logically was :—When is a Home signal an Outer Home ?

The great majority of so-called Outer Home signals were not free Acceptance signals merely because their overlap was proved by block instrument control, but because the signalman had seen the tail lamp of the previous train and the line was clear for the specified overlap past the signal. Therefore a splitting signal at a remotely-controlled junction and leading towards the signal-box was, from an acceptance point of view, just as much an Outer Home as a stop signal fixed at a quarter-of-a-mile from the Home signal and with no connections between those two signals. If that reasoning be accepted, as it must surely be, then there was no logical purpose to be served by retaining the term "Outer Home." In practice a semaphore Outer Home, with oil lamp, was not regarded as having complete stopping power in fog until a fogman was stationed at it, and if the term must be retained by the Author it seemed that it should be applied to the first stop signal, the overlap past which terminated before reaching the signal-box, thus preventing any action being taken by the signalman in regard to an approaching train over-running the signal.

The ideal system of naming was one which would be simple, yet apparent not only to the local staff, but also to every guard and driver.

**Mr. S. Williams** considered that the Author was to be congratulated on raising this longstanding problem, for the difficulties he had encountered had, by no means, been local to his own experience. The fact, though, that quite a number of attempts had been made over a period of years, by Signal and Operating Departments of British railways, both jointly and separately, to

arrive at some definite arrangement in regard to this subject, led one to the conclusion that this naming of signals, relative to their indication to drivers, and to the actual working levers, had not been quite as haphazard as the Author appeared to suggest. To formulate definite rules for that purpose, was not such an easy matter as appeared at first sight, and the Speaker's remarks were intended to emphasize that point. A case not covered by the proposed rules was that of a signal-box having a single stop signal for each direction; that might well be termed a "Block" signal.

It was presumed that significant words in the Author's rule 3 are "outside a Home signal," for in the case mentioned on page 38, paragraph 4, the term Home signal would certainly apply, with the possibility of the next stop signal ahead being in advance of the junction trailing points, *i.e.*, a Starter. If the term "Outer Home" was intended to imply that there was always a clear overlap ahead—which applied to any home signal under ordinary block working—the existence of a crossover or other point connection, between such signal and a second one at the forward end of the overlap, or even the blocking-back-inside arrangement, would appear to modify the suggested rule. Did an "Outer Home" become a "Home" signal when a train was accepted under regulation 5, because of intervening connections, or was the Outer Home just a plain "Home" signal in any case? Perhaps the Author would explain just what was intended by the word "equivalent" in this rule. Did the use of facing point protections qualify the first stop signal to be an "Outer Home?"

The term "Section signal," to indicate the last stop signal at any location, had a definite descriptive value, being frequently used to describe the last stop signal at each of a succession of signal-boxes when referring to controls by track circuit, etc. Moreover, the name implied that the next stop signal ahead will have its own distant or "caution" signal, and, to a driver, such information was vital.

That hardy annual, the home signal which is slotted as a starter by the signal-box in rear, was probably the worst case of all, and brought out the difficulty of providing a description having like meaning to both driver and signalman at all times.

On a survey of the diagrams at the end of the Paper, some alternatives suggested themselves, without necessarily breaking

down the rules proposed. These, in any case, appeared to answer as well as, and, in some cases, better than, those set down.

*Diagram* 1.—The local and through line Inner Homes could well be termed Starters; the through line to loop become "Loop Arrival;" the through line Starter be re-named Advanced Starter, leaving the Loop Line Starter to be called "Loop Departure."

*Diagram* 3.—In case 3/b, these could similarly be Home Starter and Advanced Starter, the converging signal being Siding or Loop Departure. Cases 4/b, 4/c, 4/d, and 5/b, might be similarly treated. With regard to cases 3/b/2 and 3/c, if the position of the signal-box would so vary the naming of the signals, how was the driver affected in relation to the actual layout? In case 4/c, this, again, might be resolved into Home, Inner Home, Starter, and Advanced Starter or Section signal. An alternative to that shown for 6/c, was Home 1, Home 2, Home 3, 1st Starter, 2nd Starter, and Advanced Starter or Section signal, relative, of course, to the station stop.

*Diagram* 4.—The naming suggested here, was, of course, subject to the probable provision of distant signals for what were virtually home signals at each of the separate junctions. In such case, the Inner Homes become Starters, as per diagram 5 up line, but each carrying a distant for the respective junction home and starting signals ahead. In diagram 5 itself, however, similar provisions might apply *i.e.*, the up starters to Main and Branch were virtually home signals for a named geographical junction and could be labelled as such, the up Inner Home signal being re-named as Starter.

With regard to the extension of power interlocking methods, throughout the main lines, some modification might be required owing to similarity of prefixes.

In conclusion, he would express his admiration for the way the case had been submitted. The whole subject had always been a bone of contention, and it was doubtful if any given set of rules, such as those submitted, could be agreed upon, so long as the present wording of the rule book was maintained.

**Mr. F. H. D. Page** had not had an opportunity of reading the Paper previously, and, as the subject was one to give rise to a great deal of controversy, preliminary study would have been an advantage. He thought it would be well in the first place to utter a word of warning on a tendency to complicate things

where the main idea should be simplification. The geographical position of the signals was determined by the lay-out and their relation to the signal-box had hitherto had, and, in his opinion, must continue to have, an important influence in their nomenclature. Signals to the rear of the box, therefore, must be Home signals of some description, and those in advance, Starting signals. Those were old-fashioned names and had some psychological appeal to railwaymen. The first stop signal must, of course, be the Home signal, irrespective of its position in relation to the signal-box, but such cases were not very common and presented no real difficulty.

A curious compromise, in the matter of nomenclature, at one time existed on the Great Western Railway. In cases where the Home signal stood at the end of a platform and acted also as a Starting signal for the platform, it was described as "Home and Platform Starting."

Naming a Starting signal, because of its particular distance from the box, appeared to him to be complicating matters without any corresponding advantage. With regard to signals on parallel lines, where there were, say, three stop signals on one line and four on another, he did not see that the signals on the one line had any relation to those on the other as far as nomenclature was concerned.

The Great Western originally adopted the name "Outer Home" for the "Block Acceptance" when this was introduced a quarter-of-a-mile to the rear of the existing Home signal. This practice had been given up; there was no such signal as an Outer Home—the first stop or "Block Acceptance" was the Home signal.

The naming of the signals could only be related to the line to which they applied. The Author had referred to "Forward Slotting." That was just a negation of block principle and the simplest solution, therefore, was to have none of it.

He congratulated the Author for giving them a great deal to think about and to discuss; not only that evening but for some time to come.

**Mr. A. M. Creasey** thought that there was something to be said for retaining the existing well established names of Distant, Home and Starting signals, and, whatever altered nomenclature was adopted, one could not envisage those names being superseded in mechanically-signalled territory. He could hardly

support the Author when he suggested that the names introduced in his Paper did not depart from tradition. The suggested names of the intermediate signals between the "Block Acceptance" signal and the signal controlling the entrance into the block section ahead would convey little meaning to drivers. For instance, in diagram No. 3 the signal at the leaving end of the platform under the various lay-outs was given three different names, *i.e.*, Starter, Inner Home, Intermediate Starter. To a driver that signal would probably always be known as the Platform Starter. With the growth of intermediate block sections, it would, he thought, be as well if the name of Intermediate Home were eliminated, as it might cause confusion with an entirely different signal, namely the Intermediate Block Home.

It must not be overlooked that block working was a statutory obligation, and there were only two signals really concerned, namely the "Block Acceptance" signal—whether it be Outer Home or Home—and the signal controlling the entry into the advance section. These two require a standard nomenclature, and the intermediate signals could be named "Stop" signals with numbers or letters. With regard to the latter, one would naturally consider whether a signal was necessary to protect each connection, but that would depend on traffic density and the distance between the connection and the stop signal in the rear.

With regard to the Author's suggested rule 3. When that signal—the Outer Home—was first introduced it was an additional home signal positioned with a clear length of track, not less than 440 yards, in the rear of the next stop signal. Its object and usefulness in facilitating traffic movements were well understood and appreciated. Perhaps the Author would explain what he intended to convey when he stated "having a length of clear track or its equivalent." If the equivalent referred to a connection, trailing or facing, between the outer home and the next stop signal, he thought that the signal in that case would be wrongly designated, and, as it protected an interlocking, it should be called the "Home." It would be possible for the points referred to be proved normal before *Line Clear* could be given, but that would not prevent the signalman making use of the connection after a train had been accepted.

With other speakers he congratulated the Author on the way he had presented a controversial subject.

**Mr. C. G. Derbyshire** said that in diagram No. 1, the last controlled signal on the local line was named "Inner Home" in contravention of proposed rule 2 on page 36. That did not appear to him to be justified. The name "Inner Home," as applied to the local line signal, brought it into line with the naming of the corresponding signal for the through line but it was likely to give rise to doubts in a driver's mind as to the position of the signal which admitted him into the next section. The man might ask "Where is the Local Line Starter?" If, however, the last controlled signal on the local line was named "Starter" in accordance with rule 2, there could be no misunderstanding and the essential difference between the through and local lines at that point, *viz.*, the presence of a loop line adjacent to the through, would be emphasized by the naming of the signals.

The use of the names "Intermediate Home" and "Intermediate Starter," as proposed in rules 5 and 7 respectively, might be confusing in practice. According to rule 5, an "Intermediate Home" signal was situated between the Home and Inner Home. By the same reasoning one would expect to find the Intermediate Starter between the two starters, *viz.*, Starter and Advanced Starter, whereas rule 7 stated that the Intermediate Starter was located between Inner Home and Starter.

The Author had set himself a very difficult task in trying to evolve rules for signal naming which were not only simple and logical but were sufficiently flexible to cover the great variety of circumstances met with in practice. The names proposed, however, although they were in use on some lines, seemed to obscure the meaning and to undermine the importance of the basic signals, "Home" and "Starter." He would suggest, therefore, that the names "Home" and "Starter" should be used exclusively for the first and last stop signals of a signal-box except in the case of terminals; the signals between being identified by their lever number or named "Intermediate Signal No. 1, 2, 3," etc.

In conclusion he would like to offer his congratulations to the Author, both for his Paper and also for his courage in choosing a subject on which opinion was so diverse. The value of the Paper was all the greater for that reason.

**Mr. A. Moss** felt that the Author had shown a great amount of courage in presenting a paper on such a controversial subject

as the nomenclature of interlocking signals, inasmuch as he had sixty years of old practice and prejudice to contend with.

In the Speaker's early days, when only three or four signals existed at each box, it was a comparatively simple matter to find suitable names to describe them. As development grew, and a greater number of signals were provided, it became increasingly difficult, even in collaboration with the Operating Department, to satisfy all points of view in fixing suitable names for the signals. The position was growing more complicated, and, in deference to the Author, he suggested that no satisfactory solution would be found by trying to retain any semblance of the old nomenclature.

The Signal Engineer was only interested in this question in so far as custom required either a lever badge or name board, carrying the designation of the function operated. Apart from the Distant signal, all signals were Stop signals, and it was immaterial to the Signal Engineer whether the name "Outer," "Inner," "Intermediate" or "Advance" was applied, because he knew from the position of the signal what particular function it should fulfil. One needed to look ahead and to realise that interlocking signals were now being operated by other means than by levers. In such instances no question of the nomenclature of signals had arisen, simply because there were no lever badges to engrave nor nameboards to paint. The signalman did not miss the descriptions because almost invariably he referred to them by their number. Further, the driver, being most concerned, could not possibly have any idea of the designations applied to the signals at each respective box, beyond that he could broadly determine the "Distant," "Home" and "Starting" signals. Why, then, retain these names? The fact that they appeared in the rule book was not a sufficient answer. He suggested, therefore, that the case could best be met by eliminating all descriptions of running signals, and fixing a number plate on each signal. The number plate would carry the number of the lever operating the signal and also a suffix letter indicating the signal-box from which the signal was controlled. At certain places that practice was already carried out, and therefore why not make it universal practice?

**Mr. A. Oldham** considered that the naming of signals was a difficult matter so far as the Signal Engineer was concerned. Even when he had given the most careful consideration to the

naming the Operating Department frequently considered it necessary to make changes. It would thus appear that the Author's suggestion that the matter should be investigated by the Institution was a good one, provided that representatives of the Operating Department, who were members of the Institution, should form part of such a committee.

In his opinion too many names were in existence with regard to stop signals and he suggested for consideration that the matter might be dealt with by a system of numbering. With regard to the Distant signals he did not consider it necessary to make any alteration in the naming but that the following stop signals should be known as down/up" Home 1," " Home 2," " Home 3 " and that the last signal for leaving a particular signalman's territory should be called down/up " Starter." If that suggestion was agreed it might be desirable to provide corresponding number plates on the signal posts. Drivers were conversant with the number of stop signals at any particular box and if the suggested number plates were added they could always correctly describe at what signal they were brought to a stand or had otherwise to refer to.

There would, in his opinion, be no difficulty in applying this numbering system to any of the diagrams in the Paper. At junctions, such as shown in diagram 4, the signals to and from the branch would have to be named somewhat as follows :—" Up Home 2 to South Curve," " South Curve Home 3," etc.

He agreed that the Author should be congratulated on producing a very well written Paper.

**Mr. W. S. Roberts** observed that the Author approached the question of the nomenclature of signals in connection with the practice in this country and in relation to the railway companies' rule book. The origin of the names " Home " and " Starting " goes back to the early days of signalling, and it was rather a case of conjecture as to why they were so called.

Many of them had to deal with the nomenclature of signals from an international point of view and in some countries " Home " was a word which only had one interpretation—*i.e.*, the house in which one lived. In such instances the name " Home " was misleading and if four or five different classes of home signal were referred to, they could quite understand what, say, an Engineer of Spanish nationality thought of the Signal Engineer of this country.

This nomenclature, therefore, was paradoxical, and, when analysed, was ridiculous—as, for instance, each Home, in its horizontal position was a " Stop " signal and, consequently, when pulled " off " must necessarily become a " Starting " signal, and, conversely, each " Starting " signal, in its horizontal position, was a " Stop " signal, so, if the logic was correct, that also ought to be called a " Home " signal.

There was no doubt that the nomenclature of signals now required to be modified, to be in keeping with the modern improvements of signalling. He was in agreement with Mr. Downes that, mainly, the two " Stop " signals of paramount importance were :—(1) The first one giving access into an interlocking area, and (2) the last one for leaving such an area and entering the section ahead. Those between were merely accommodation signals and for them such a method as mentioned by Mr. Moss was worthy of consideration.

As a means of clarifying existing practice and harmonising the same with the rule book in this country, they were deeply indebted to the Author for his Paper, and the Speaker tendered to him his thanks for the same.

**Mr. Rudd** (communicated) :—The Institution of Railway Signal Engineers honoured me greatly in 1913 in electing me an Honorary Member. I have not been of much assistance at any time and certainly not in recent years in exchange for your courtesy.

We have had our problems in this country which have occupied all our time ; consequently, we have had little opportunity to branch out and study those of other countries.

I have read with great interest the Advance Copy of Mr. Egginton's Paper on " The Nomenclature of Interlocking Signals," which was, I presume, read at the March 13th meeting.

The problem of naming signals which he presents is certainly complicated. I am wondering whether a statement as to the United States practice would be helpful.

The Standard Code of the American Railway Association (now the Association of American Railroads) Block Signal and Interlocking Rules adopted January 17th, 1928, contains the following definitions :—

*Fixed Signal.*—A signal of fixed location indicating a condition affecting the movement of a train.

*Block Signal.*—A fixed signal at the entrance of a block to govern trains entering and using that block.

*Interlocking Signals.*—The fixed signals of an interlocking plant.

*Home Signal.*—A fixed signal at the entrance of a route or block to govern trains entering and using said route or block.

*Distant Signal.*—A fixed signal used in connection with one or more signals to govern the approach thereto.

*Dwarf Signal.*—A low Home signal.

You will note that a Home signal is "a fixed signal at the entrance of a *route* or block to govern trains entering and using said route or block," and a Distant signal is used to govern the approach to other signals, but at which no stop is required.

In automatic block territory all the signals are Home signals, although they govern the approach to other signals. Therefore, in ordinary practice all the signals are Home signals.

Each one of the signals that Mr. Egginton refers to and shows in the diagram governs to a route or block and is, therefore, a Home signal. In our system, each signal governs to the next.

Could not your problem be solved by calling every one of these signals a Home signal and stop right there?

In the diagrams numbered 1 and 2, all signals shown are interlocking signals; in diagram No. 3, 3b, Home and Inner-Home are interlocking signals and the starter a Block signal; diagram 3c, the advance is a Block signal; but all are Home signals under our practice.

It has been thirty-one years since I was in England and Scotland, and I am, therefore, not very well posted on your present system. Therefore, my suggestion may have little value and may even be ridiculous as applied to your particular problems. However, it is offered in the hope that it may be worth something.

**The Author,** replying, said that he had to thank them for the generous reception they had given to the Paper. He had anticipated a measure of support in certain quarters and of opposition from others and appeared to have received a good measure of both. It must be remembered, however, that the Paper had been put forward purely as a basis for discussion and did not necessarily portray his personal point of view.

He appreciated the fact that to arrive at a satisfactory solution of the problem was an extremely difficult matter, but, if the question was to be discussed at all, some basis must be provided

for such a discussion. Personally, he felt that the ultimate solution would lie in the direction of eliminating names altogether and using a combination of letter and lever number on the post itself for identification purposes, as referred to at the end of the Paper. From the opinions put forward that evening it would seem that such a solution would find considerable favour.

The President, in his Presidential Address, referred to the standardisation of signalling principles, and the real point of the present Paper was, that it was an appeal for an attempt at standardisation of signal nomenclature. Mr. Oldham in his remarks supported the suggestion, provided Operating Department members formed part of a committee for the purpose. That was obviously essential, but any attempt at standardisation must come from an authoritative source and a suitably composed committee of the Institution would appear to offer such an opening.

The President, in his remarks, gave the definitions proposed by the British Standards Institution but, unfortunately, they did not go far enough, nor did they answer clearly the question " What should this signal be called ? " in any particular case.

Mr. Downes also referred to this comparative vagueness. He also introduced, " if names are preferred," another new name, "Arrival Home." That fell into the same category as "Acceptance Signal " or "Acceptance Home " in that it was an entirely new name and would require unanimous agreement before it could be adopted. It still left the question of names for intermediate signals unsolved. His further remarks tended to the elimination of names and the substitution of numbers and prefix letters. The Author would suggest, however, that U and D were not entirely suitable, as it is conceivable to have a distant below the "Section" signal of the next box in the rear, both bearing the same number and prefix. A distinctive prefix, indicating the box working the signal and its lever number, would appear to meet the case rather better except so far as lever badges were concerned.

Mr. Wagenrieder's reference to a stop signal protecting a platform with the first fouling point beyond the platform departure signal, raised a point which was, admittedly, not covered by the proposed rule 1. Such signals would, however, not be provided to-day and existing signals in such positions were being dispensed with, as redundant, wherever possible. Where they still re-

mained they must, of course, be termed " Home " signals and the platform departure signal suitably named accordingly.

That gentleman's next reference was to rule 39 (b)—Trains not to proceed to advanced starters in fog unless a track circuit is provided—and its relation to starting signals at considerable distances from the box. Did not the rule itself really answer the query ? Where a signal, whether it be called a " Starter " or "Advance ", was over 400 yards from the box, a track circuit to the rear of it was to-day considered essential. A number of cases existed on the Southern Area of the L.N.E.R. where starters were anything up to 800 yards from the box, notably in connection with loop lines, but invariably a track circuit had been provided to the rear of such signals and therefore the rule did not apply.

Mr. Wagenrieder's concluding remarks—as to outer home signals and the possibility of applying this term to the first stop signal in every case where the block overlap terminated short of the box— raised a novel point of view. If that suggestion were proceeded with, "Acceptance Signal" would probably be a better term. In his opinion, however, the term " Outer Home " should be applied only to those signals where the distance to the next signal is not less than block overlap distance and it is impossible to make a fouling movement in this area. The question of following trains is looked after, either by track circuit overlap control on the block instrument or by the necessity of the signalman seeing tail lamps.

Mr. Williams stated that it was not an easy matter to formulate definite rules and he quite agreed. But was not that very difficulty indicative of the necessity of attempting something, if only for the benefit of newcomers to the profession of Signalling ? He also remarked that the case of one stop signal only was not covered by the rules, but reference to page 39 under the heading " 1—Home Signal " will show that " the minimum requirement for a block post is a home and distant." That, the Author thought, Mr. Williams would agree, was such general practice as to need no comment. His suggestion to call such a signal a " Block " signal was apt to be confused to-day with " Intermediate Block Home " signals.

Mr. Williams followed Mr. Wagenrieder in his remarks about outer homes and the previous remarks as to the overlap being clear of possible fouling movements again applied. Although, under ordinary block working, a clear overlap existed inside every

home signal when a train was accepted, in most cases it was possible, if rules were broken, to destroy that clear overlap by operating levers of point connections in the overlap area. Even if such point levers were proved normal at the moment *line clear* was given, the reciprocal did not hold good, for it was not usual to lock these levers once *line clear* had been given. He wished, therefore, to emphasize his opinion that "Outer Home" should not be used unless it was impossible to make a fouling movement in the overlap area.

The phrase " or its equivalent " in the proposed rule (3), was inserted to cover cases where splitting points were so far from the box that a complete block overlap existed inside either of the splitting signals before the next signal was reached. In such cases block overlap control of the block instrument, by means of track circuit, should be made conditional upon the appropriate position of the facing points. In view of his previous remarks defining outer homes, the question of block telegraph rule 5 being applied because of " intervening connections," as mentioned by Mr. Williams, did not arise, as the first signal was not an outer home. It is rare for that rule to be applied to a true " Outer Home," as it could only be used for following trains and the tail lamp question complicated it. In the few cases where it was applied, the first stop signal would still be an " Outer Home."

The remarks made by Mr. Williams regarding alternative names " without necessarily breaking down the rules proposed," opened up a new channel for exploration. The suggestion for " Loop Arrival " and " Loop Departure " and the consequent rearrangement of the main running signals in diagram 1 and the similar variations in diagram 3 presented a new point of view to the Author, as those names had not occurred, at any rate frequently, in his personal experience. That emphasized the advantages to be derived from discussing a subject of this description from an inter-railway point of view.

Mr. Page's remarks about the present Great Western practice of invariably calling the first stop signal "Home " and abandoning " Outer Home " lent further colour to the statement just made, as that also was new to him, as it must be to many other members of the Institution. At the same time he would like to know what names were applied to intermediate signals where several occurred.

He must agree with Mr. Creasey's remarks regarding the variation in names of " Platform Departure " signals and also the

possible confusion between "Intermediate Home" and "Intermediate Block Home," but, if names were to be retained, what alternative was there? Did it not again point to the elimination of names altogether? Mr. Creasey's concluding remarks about "Outer Homes" was, he thought, answered adequately in the reply to Mr. Williams who had raised much the same question.

Mr. Derbyshire queried the name "Local Inner Homes" in diagram 1. He could only say in reply that those were actual names at the place upon which diagram 1 was based, and that the reasons for such naming were as set out in the Paper. If Mr. Williams' suggestion of "Loop Departure" for the loop line outlet signal were adopted and the through line signal opposite became an "Advanced Starter," both the through and local platform departure signals could be called "Starters" and the proposed rules adhered to. The suggestion to retain "Home" and "Starter" for the first and last interlocking signals, and to number all the intermediate stop signals, was one deserving of consideration in any future deliberations on the subject.

Mr. Moss gave as his opinion that no satisfactory solution would be found by retaining any of the old nomenclature. As the Author had already stated, in spite of what was contained in the Paper, that was his personal opinion also. When one considers the possible extension of relay interlockings with route plungers, and of C.T.C. installations—where, as Mr. Moss pointed out, lever badges no longer exist and the consequent necessity for a name was largely eliminated—one was inclined more than ever to the opinion that a descriptive number plate on the signal post would be the ultimate solution of the problem.

Mr. Oldham referred to the suggestion for a committee of the Institution to investigate the subject and he had dealt with that question earlier. That gentleman had also put forward a suggestion for numbering intermediate signals, closely resembling that made by Mr. Derbyshire. He quite agreed with Mr. Oldham that such a system was applicable to any of the diagrams and certainly did offer one solution to the problem. But who was there with the necessary authority to make this, or any other system, generally applicable? Each individual railway company could, of course, make its own decision, but in his opinion that was not sufficient. If one reflected on the possible ultimate unification of all the railways of the country, an inter-railway

decision seemed highly desirable, and the Institution appeared to offer itself as the obvious body to make such a decision.

Mr. Roberts commented on the international point of view and illustrated how apparently foolish some of their names must appear to a foreigner. He did not, however, give a clue as to what corresponding method was used abroad. His suggestion for numbering intermediate signals resembled those put forward by other speakers and was one more argument in favour of largely eliminating names altogether.

Mr. Rudd, the Signal Engineer of the Pennsylvania Railroad, in his written communication, gave the Standard Code of American naming, which was very interesting. It would appear, however, that the terms " Block Signal " and " Home Signal " were more or less interchangeable. It would also seem from Mr. Rudd's remarks that the space between each two stop signals was, in American practice, a " block." That was not the case here with ordinary semaphore signalling. It was, however, only a small step from his suggestion, to call all stop signals " Homes," to that put forward by various speakers, of having one name only with qualifying numbers.

Summing up, the general trend of opinion was undoubtedly in the direction of reducing the number of names to a minimum, rather than in adopting any set sequence of names whatever they might be. Why not then eliminate all names and substitute number plate descriptions on the posts ? To quote Mr. Moss' concluding words " At certain places this practice is already carried out and therefore why not make it universal practice ? "

**The President** thought that the Author had been amply repaid, for the trouble he had taken, by the splendid discussion his Paper has brought forward. He would ask them to show their appreciation in the usual way. (Applause).

In response **the Author** wished to thank all the speakers for their kindly remarks regarding the Paper and, to quote once again, he thought, with the President, that he had been " amply repaid for the trouble taken by the splendid discussion the Paper had brought forward."

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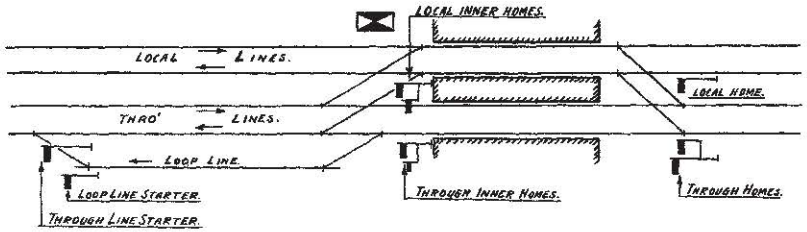
Part 1
Inset Sheet No. 1

# NOMENCLATURE OF INTERLOCKING SIGNALS.(EGGINTON).

## DIAGRAM No.1.

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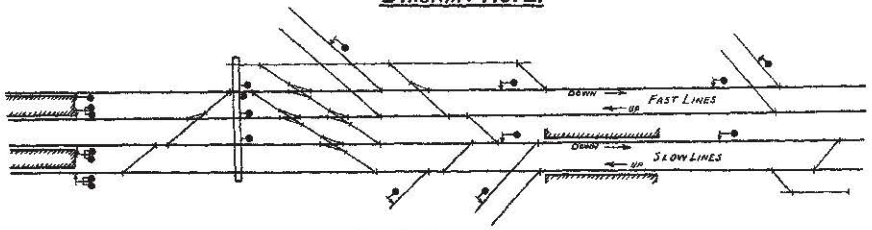
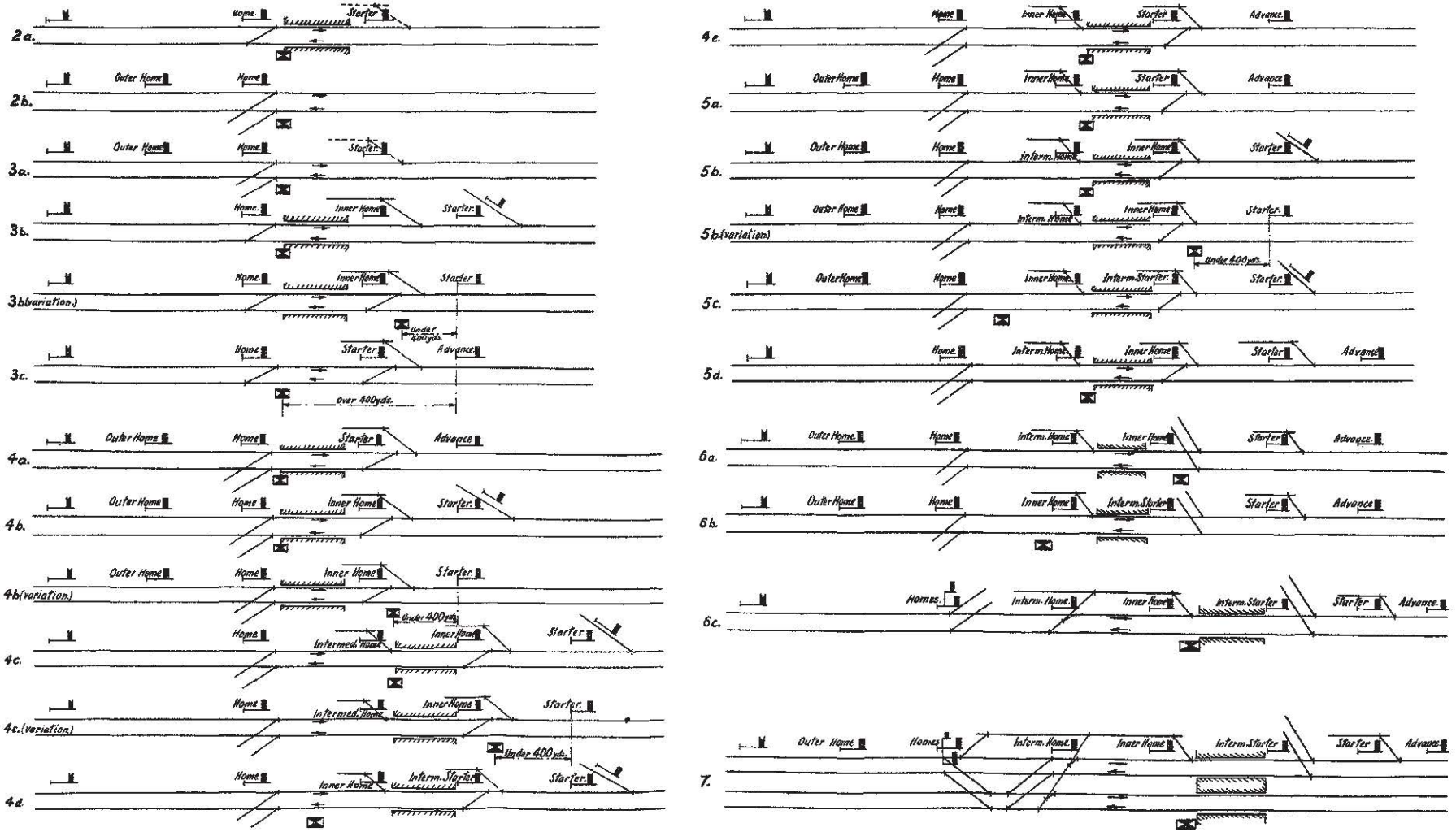



DOWN ROAD SIGNALS ONLY SHEWN.

# DIAGRAM No. 3. NOMENCLATURE OF INTERLOCKING SIGNALS. (EGGINTON).



# NOMENCLATURE OF INTERLOCKING SIGNALS.(EGGINTON).

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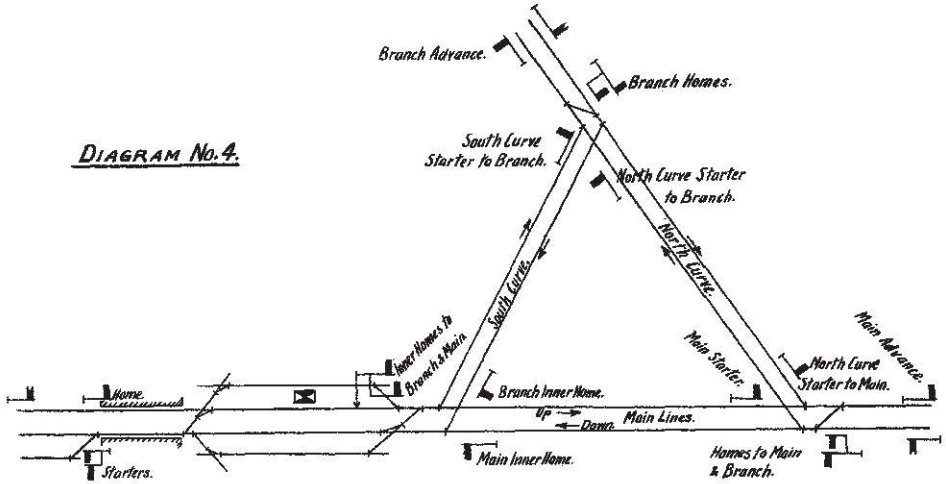
Part 1
Inset Sheet No. 3

DIAGRAM No. 4.

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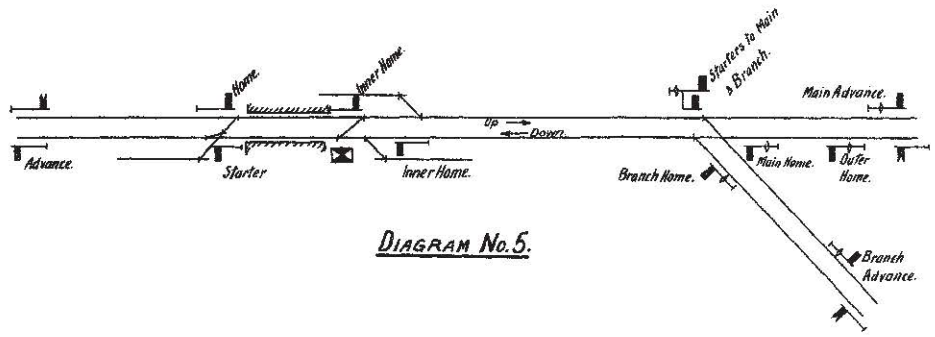


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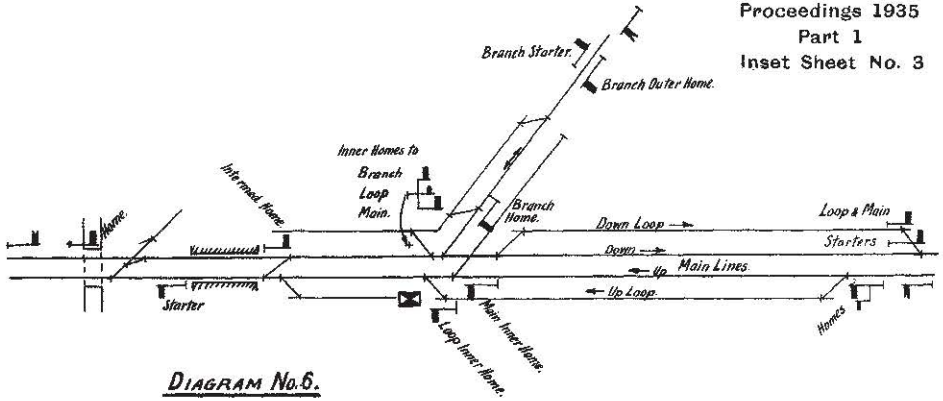


DIAGRAM No. 7.