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BRITISH RAILWAYS

(Private and Not for Publication)

MAGOR SIGNAL BOX

DESCRIPTION and METHOD of OPERATION

of the

SIGNALLING CONTROL PANEL

SIGNALLING RECORD SOCIETY

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Description and Method of Operation of the Signalling Control Panel

PART 1—DESCRIPTION

1. GENERAL

Major signal box contains a mechanical lever frame working the points and connections in the immediate vicinity of the signal box together with associated semaphore, colour and position light signals. In addition a control panel of the "mosaic" type using the "Entrance-Exit" principle is provided to work the points and signals associated with the connections giving access to and from the East end of Spencer Works, the protecting signals and the release of the gates at Bishton Crossing, and Signals MG.103 and MG.303.

2. CONTROL PANEL

The control panel depicts diagrammatically the running lines, points and signals in the area controlled therefrom.

(1) Throughout the pictorial layout depicting the running lines are series of rectangular apertures uniformly spaced in which white lights appear when the route has been correctly set for the passage of a train. These lights extend from the position on the panel corresponding to the signal in question as far as the next signal in advance. In addition, as explained in PART 2, certain white lights become illuminated in isolation.

Route Indications

(2) The extent of all track circuits is also shown on the pictorial layout and their occupancy is indicated by the display of a series of red lights in the aforementioned apertures.

Track Circuit Indications

When no light appears or the white lights are displayed, the applicable track circuit is clear.

(3) In the upper portion of the control panel, free thumb switches are placed, one such switch being provided for each set of points, to enable the points to be operated individually if and when required. An arrow is engraved on the face of the switch, and the latter may be turned so that the arrow is positioned upwards or inclined either to the left or right. To reverse (or maintain reverse) individually a set of points, the point switch is turned to the right, and similarly to the left for the normal position. The switch is otherwise allowed to remain in the mid-position when automatic route setting is in operation. To the left or right of the point switch is shown that position in which the other point switch, interlocking with the points in question, must be locked before the points can respond to the switch. A red light mounted immediately above the point switch is caused to be illuminated whenever the points are locked either by the

Point Switches

occupation of track circuits or by reason of the interlocking with signals or the other set of points, in which circumstances the points will not respond to the operation of the switch. The red light also appears immediately the point switch is placed to either the normal or reverse position and the points have correctly responded, to indicate that the points will be held in that position until the switch is restored to the mid-position.

(4) Immediately to the left or right of the red light referred to in the above paragraph, a white light is illuminated when the points are correctly detected normal or reverse as the case may be. In the case of points 702, these will not be shown to be detected normal until such time that the spring points in the Steelworks Ingoing Road protecting the Down Relief are detected normal.

The number corresponding to that of the point switch is affixed on the sleeper at the appropriate points together with an arrow which indicates the direction of movement of the point tongues required to place the points in the normal position.

(5) In addition to the above point indicators, the operation to the ON position of the switch labelled POINT INDICATIONS in the upper portion of the signalling control panel will cause the applicable rectangular aperture forming the normal or reverse position of the points on the track diagram to be illuminated by a white light. The appropriate indication will remain illuminated so long as the POINT INDICATIONS switch is in the ON position. These two white indications will also be caused to flash alternately irrespective of the position of the aforementioned switch whenever the points concerned are out of correspondence with their controlling relays and hence during the time the points are being moved.

(6) In the event of a points contactor failing to release after the points have been called and correctly set, a flashing red light will appear to the right of the POINTS switch in the upper portion of the control panel and a warning buzzer will sound. This audible warning can be silenced by turning the switch from CLEAR to FAULT position. The visual warning will then exhibit a steady red light which will remain until the Signal Technician has corrected the fault whereupon the audible warning will again sound and the white light commence flashing. The audible warning will be silenced and a steady white light exhibited by returning the switch to the CLEAR position.

(7) For each signal controlled from the panel, a free rotary switch is provided on the panel track line in a position corresponding to the site of the signal. Engraved on the face thereof is a red arrow. To maintain or restore a signal to danger, the switch must be in such a position that the engraved arrow lies at right angles to the track line (normal position), whilst as a preliminary to clearing

the signal, the switch must be turned through 90° so that the arrow points along the track line in the same direction as the movement controlled by the signal.

(8) Incorporated in the signal profile adjacent to each signal switch is an aperture capable of displaying either a red or green light according to whether the signal is in the danger position or is exhibiting any one of the proceed aspects respectively. A total failure of the signal lamp of a multiple aspect signal will cause the indication lamp in the signal profile to be extinguished.

(9) All signals are approach locked where necessary, i.e., the interlocking will be held even if the signal switch is restored normal should a train have reached a certain point on the approach side of a signal whilst a proceed aspect was being displayed. The interlocking will then be held until either the train passes the signal or an automatic time release has operated. The time release will not commence to operate until the signal is properly at danger, and during the time the approach locking is effective, the route lights concerned will remain alight. The standard timing of the automatic release is two minutes. The point at which the approach locking commences is shown on the control panel by the number of the signal being affixed in brackets alongside the appropriate track circuit joint symbol. This will extend more than one signal section in rear and thus the approach locking is effective conditionally on the intervening signal also having been clear.

(10) In the majority of cases, a push-button, coloured red, is provided on the track line at the forward end of the route. In addition to turning the signal switch to the reverse position, the appropriate push-button for the desired route must subsequently be depressed momentarily in order to clear the signal.

(11) Normally, signals controlled from the panel will be replaced to danger by the train and will not clear again until the appropriate signal switch has been restored normal and then re-operated together with the associated push-button. To avoid the necessity of this for a number of trains following in the same direction, three rotary switches (one each for Up Main, Up Relief and Down Relief respectively) are provided on the lower right hand portion of the panel. When one of these switches is rotated to the AUTO position, the signals concerned will then clear automatically in accordance with the track circuit conditions without further action by the Signaller provided the corresponding signal switches are left reverse. (Note: Signals DM.152B. and UM.153 are not "stick-controlled"; i.e., provided the appropriate signal switch is left in the reverse position, the signals will clear automatically in accordance with track circuit conditions at all times.)

(12) In the event of it becoming necessary to resort to hand operation of the power operated points at the East End of Spencer Works a hand crank, retained in a special instrument located adjacent to the points, is provided. The hand crank may be withdrawn on an electrical release being given by depressing a push-button located in the upper left-hand portion of the control panel. A white light remains illuminated above the push-button so long as the hand crank is locked in the instrument. When the hand crank has been released, a red light will be exhibited in place of the white.

Hand
Crank
Release

(13) To effect the release of the level crossing gates which are worked from Bishton Crossing Ground Frame, a rotary switch, numbered 706, is placed on the control panel above where the ground frame is shown diagrammatically. When the gates are properly locked across the public road and all signals interlocking with the gates are in the danger position and the controlling track circuits are unoccupied neither of the two indication lights is illuminated. When any signal interlocking with the gates is cleared (or if at danger it is approach locked), or a track circuit is occupied, the left hand indication light, which is red, will be illuminated.

Ground
Frame
Release

The illumination of a white indication light to the right of the switch shows that a release has been effectively given to the Ground Frame. When advantage has been taken of the release the indication will alter to red.

(14) The extent of the overlap ahead of a signal is denoted on the panel by a dot being placed inside the rectangle that appears in the track line to indicate a track circuit insulated joint.

Extent of
Overlap

(15) Also located in the upper half of the panel are the following, reference to their operation being made in PART 2 of this publication:

Miscellaneous
Equipment

- (a) Signalling Control Panel Indications Dimming Switch;
- (b) Signal Lamps Indications and Switch;
- (c) Socket for Testing Panel Indication Lamps.

PART 2—METHOD OF OPERATION

1. POINTS

(1) Points are ordinarily operated automatically to the required position as necessary whenever a signal switch and associated push-button (where provided) have been operated to clear a desired signal, provided the point switch is in its mid-position and the points are free of interlocking or track circuit control. The setting up of a route, as the process of reversing a signal switch and depressing the push-button is termed, calls the points to

Automatic
Operation

the required position and when they are properly set, locks them in that position for as long as the signal switch remains reverse.

(2) Points will continue to remain in the same position even after the signal switch is restored normal until called to a different position by the setting up of another route.

Points
Non-
Restored

(3) The points may also be operated individually, if free, by use of the point switch. When the points have set properly they will become locked and it will not be possible to set up a route which requires the points in the opposite position until the switch is replaced to the mid-position. When it is desired to turn the switch from normal to reverse or vice versa, a pause must be made in the mid-position until the red lock light is extinguished.

Individual
Operation

(4) The points, whether being set automatically or individually, can only operate in the correct sequence as demanded by the point-to-point interlocking.

Point-to-
Point
Interlocking

(5) The points will remain locked after being set for a route if the approach locking becomes effective until the time release has operated, or if a train has passed the signal, until all the relevant track circuits have been cleared.

Track Circuit
and Route
Locking

(6) In the case of the Down Relief facing points 702, in addition to the above track circuit locking, the points will also be held by the occupation of track circuits on the approach side of the protecting signal for a predetermined time even if the signal is maintained at Danger to ensure that they cannot be reached by a train under any circumstances whilst they are in motion under normal conditions. This track circuit locking is released by the operation of an automatic time release to permit the points being altered after the train has come to a stand at the protecting signal.

Approach
Locking of
Facing
Points

(7) In order to facilitate traffic working, the Down Relief facing points are not locked in either position when signal MG.402 is operated to a proceed aspect provided that the overlap applicable to the position to which the points might be altered is clear. Approach locking of these points, however, will apply as in the foregoing paragraph.

Facing
Points in
Overlap

(8) Should the two white indications forming the normal and reverse positions of the points on the control panel continue to flash alternately for a greater time than would ordinarily be taken for the points to complete their movement after a route has been set up, the signal switch should be restored and an attempt should be made to operate the points by means of the individual points switch before treating them as defective. If an obstruction unduly interferes with the free movement of the points, an overload protection device will come into operation to disconnect the power supply and the points will be

Failure of
Points to
Detect

stopped in mid-stroke. This device will be automatically reset as soon as the point switch is operated to reverse the direction of motion of the points, so that further attempts can be made to set the points to the required position.

(9) During the time it is necessary to resort to hand-signalling, or whenever other circumstances dictate, the point switches must be used to set and lock the points in the required position before a train is authorised to travel over them other than by means of the fixed signals. It must not be assumed that the points are locked when the switch is turned to the required position unless the red lock light is illuminated. This does not avoid the need for the points to be clipped and padlocked for each movement as necessary.

(10) In the event of the FAULT indication becoming displayed, normal working must be suspended and the Signal Technician immediately advised. No attempt should be made to alter the position of any of the points either by means of setting up a route or by the operation of the individual point switch until the Signalman has been informed that the fault has been rectified. Attention is drawn to the importance of ascertaining that both facing and trailing points are correctly set before a train is authorised to pass over them other than by means of the fixed signals.

(11) If it becomes necessary to resort to hand crank operation, all signals interlocking with all the points must first be placed at Danger. This is a necessary condition before the release can be effected as described in paragraph (12) and the subsequent withdrawal of the hand crank from the instrument in which it is kept will maintain such signals at Danger.

The person appointed to operate the points by hand must, on arriving at the site of the hand crank release instrument, telephone the Signalman and await the latter's instructions before attempting to remove the hand crank from its instrument.

During the time of the failure it may, however, be feasible to properly signal movements other than over the defective points provided the hand crank is restored to its instrument and the release withdrawn. Before this is attempted, the defective points must first be clipped and padlocked in the position appropriate to the signalled movement which is about to take place.

The point machine is secured by a padlocked hasp, the key to the padlock being secured to the hand crank. The hasp must be released to permit the insertion of the hand crank and the unsecuring of the hasp cuts off the electric power to the point machine. After the points have been operated by hand, this hasp must not be secured again, neither must the hand crank be restored to its instrument

until the person appointed to operate the points by hand has been instructed to do so by the Signalman. This instruction must not be given if the Signalman has given permission for a train to pass over the points until such train is clear of them.

In no circumstances must movements be signalled by means of the fixed signals over points which are considered defective (even though a correct indication of their position is being returned to the signal box) until the defect has been rectified.

(12) In order to release the hand crank from its instrument, the Signalman must, after coming to an understanding with the person appointed to operate the points by hand, depress the hand crank release push-button on the control panel until the indication light changes from white to red, after which the push-button may be released. When this light subsequently changes from red to white, this indicates that the hand crank has been restored to its instrument and is properly locked. Normal working by means of the fixed signals may then be resumed.

(13) In the event of a failure occurring whereby the hand crank cannot be withdrawn from its instrument, the emergency release key which is kept in a locked glass-fronted case in the signal box should be issued to the person appointed to operate the points by hand, after all signals interlocking with all the points which may be operated by the hand crank have been placed and maintained at Danger. This release key when inserted into a keyhole in the release instrument, will enable the hand crank to be withdrawn. A suitable entry must be made in the Train Register on each occasion that the emergency release key is issued and on its return. When the emergency release key is no longer required for use, the Signal Technician must be informed.

(14) The point machines are of the Westinghouse Brake and Signal Company's manufacture, Style M3, and the relevant instructions on page 140 of the Regional Appendix must be complied with insofar as they apply.

(15) Switch collars must be placed over the point switches whenever the occasion demands.

2. SIGNALS

(1) Signals are operated by first turning the appropriate signal switch to the reverse position and then momentarily depressing the push-button (where provided) for the required route.

(2) For the signal to clear, the switches or levers for all conflicting signals must have been replaced to the normal position and, if colour light signals, the latter have been returned properly to Danger and freed of approach locking after the previous movement.

(3) Where power points are involved, these will be set automatically and locked in the required position if not already in that position provided they are free to be so set at the instant of turning the signal switch and depressing the push-button. Should a point switch not be in the mid-position but in a position holding the points other than as required, the point switch must first be placed to its mid-position before the signal switch and push-button are operated. Similarly, if the points are locked by reason of the interlocking or track circuit occupancy the action of turning the signal switch and depressing the push-button will be ineffective.

Automatic
Route
Setting

(4) Where power points are involved it follows, therefore, that a route cannot be preselected, i.e., stored up, since the depression of the push-button is ineffective unless at that instant all the points concerned are free to respond or are already set in the required position.

Prevention
of
Preselection

(5) Where mechanical points are involved, it will not be possible to set up a route, unless all points have been placed in their correct position and their facing point locks (where provided) operated beforehand.

Mechanical
Points

(6) After the route has been set up and the power points where these are involved have been locked in the required position (or mechanical points have been placed in their correct position), a succession of white route lights will be illuminated in turn throughout the extent of the route. Whilst the route is so illuminated, no conflicting or opposing route can be set up.

Indication
of Route

Should a signal become approach locked, the route lights will continue to be displayed until the approach locking has been released.

(7) If a route has been correctly set up as described, the signal will clear either immediately or after the necessary delay where approach control is in force.

Clearing of
Signals

(8) When a train has passed a signal which has been cleared for it, the white route lights appropriate to each successive track circuit will be extinguished and red track circuit lights will take their place. If the signal switch has not been restored to normal after the passage of the train, white route lights will again take the place of the red lights as each track circuit becomes clear. Should a train pass a signal at Danger, all the track circuit indications applicable to the particular track circuit will show occupied irrespective of point setting.

Track
Circuit
Occupancy

White route lights will not be exhibited in advance of automatic signals over which no control from the panel is exercised.

(9) Multiple-aspect colour light signals are controlled by track circuits and interlock with points and other signals as far as the overlap in advance of the next signal ahead. In those cases where the application of such controls in

Multiple
Aspect
Signals

advance of the next signal ahead would be too restrictive, the controls are modified and the signal in rear is allowed to display a yellow aspect after the approaching train has been brought to, or nearly to a stand, provided the line is clear as far as the next signal.

Multiple-aspect colour light signals will be replaced to Danger on being passed and the signal switch should then be restored to normal in accordance with the Rules (except when automatic working is in force or where the signal switch controls an automatic signal) and the signal will not clear again until this has been done and the switch, together with the push-button, if provided, re-operated.

(10) The position-light signal associated with signal MG404 interlocks with the points in advance but is not controlled by track circuit except as in the following sentence. The signal is replaced to Danger on being passed and cannot again be cleared until the signal switch is restored to normal as described in paragraph (9) above.

Subsidiary
Signals

(11) Under "Delayed Yellow" conditions and in the case of signals in rear of facing junctions over which only a restricted speed is permissible, the appropriate signal will not clear after the route has been set up until the berth track has been occupied (for a given time if necessary) so as to ensure that the speed of the train has been suitably reduced.

Approach
Control

(12) Except in emergencies, after a signal has been cleared for an approaching train, the signal switch must not be restored to normal if the train has passed the point at which approach locking commences unless an intervening signal is already at danger.

Restoring
Signal
Switches

If a signal is replaced to Danger in such circumstances, the aspect displayed by the signal in rear will alter to a more restrictive one in the face of the approaching train.

Should a signal switch not be restored to normal after the passage of a train (except when automatic working is in force or where the signal switch controls an automatic signal), a white light immediately in advance of the switch will be caused to flash until this has been done.

(13) Except when automatic working is in force or where a signal switch controls an automatic signal, signal switches should always be maintained in the normal position, unless required to operate a signal for a train, in the interests of orderliness and efficient operation of the panel.

Normal
Position of
Switches

(14) When a route is set up preparatory to clearing a multiple aspect colour light signal the position of any power operated points which may be in the overlap concerned is indicated by the appropriate white light forming the normal or reverse position of the points on the control panel becoming illuminated.

Indication
of
Overlap

(15) It is essential that when requiring to set up a route, the push-button be depressed only after the switch has been placed to the reverse position, otherwise the associated relay will not operate and, therefore, the route will not be set up. The push-button must also be fully and deliberately depressed, as a mere flick may not allow sufficient time for the relay to operate.

Push-Button
Operation

(16) Switch and push-button collars must be placed over the signal switches or push-buttons whenever the occasion demands.

Switch
Collars

3. GROUND FRAME RELEASE

When the signalman receives advice from the crossing-keeper at Bishton Crossing Ground Frame that the gates require to be placed across the railway for the passage of road traffic, he must, provided no train is within that distance which causes a signal to be approach locked (see clause 9 on page 3) place the signals protecting the level crossing to Danger if not already in that position. Then provided no indication is given by the light on the left of switch 706, rotate the switch so that the arrow engraved on the face thereof is pointing to R. When this has been done, a white light will appear on the right hand side of the switch and will indicate that a release has effectively been given to the Ground Frame. When this light changes from white to red, this will indicate that the crossing-keeper has unlocked the gates.

Bishton
Crossing
Ground
Frame

When the right hand light changes in due course from red to white, indicating that the gates have been locked across the public road, the switch should be rotated so that the arrow inclines to the left.

Should the red light on the left of the switch be illuminated, any attempt to release the ground frame will remain ineffective.

A plunger is provided at the ground frame to operate an emergency bell in Magor Signal Box. The ringing of this bell will indicate an emergency has occurred at the crossing affecting the safety of the line and the signalman must immediately place all signals protecting the crossing to Danger and maintain them in that position until he has ascertained the circumstance.

Emergency
Bell

This bell must be tested at 10.0 a.m. every day to ensure it is working correctly, and an entry made in the Train Register.

4. GENERAL

(1) When so desired, the indication lights on the control panel may be dimmed by the use of the PANEL LAMPS switch.

Panel
Dimming
Switch

(2) In the event of a complete power failure, even for the limited time such as would exist before the standby supply is connected, signals in advance of an approaching train would be caused to fail and under no circumstances must any route be set up, either by the use of signal switches or by individual point switches until it has been ascertained that no train is approaching on or foul of the route intended to be set up.

Power
Failure

(3) Should the red indication, AUX (auxiliary), to the right of the SIGNAL LAMPS switch commence to flash (which indication is accompanied by a warning buzzer), indicating that a main filament of a multiple-aspect signal has failed, the switch should be turned to the AUX position. This action will cause the audible warning to be silenced and for the flashing red light to be substituted by a steady red light. The Signal Technician should be advised of the circumstances when next on duty, or not later than 15 hours after the initial indication of the failure, whichever is the less. When the lamp has been replaced, a white indication to the left of the switch will commence to flash accompanied by the audible warning. The turning of the switch to the MAIN position will cause the audible warning to be silenced and the flashing white light to be steadied.

Main
Filament
Failure

A signal lamp should not be regarded as having failed unless the aperture in the signal profile referred to in PART 1, 2 Control Panel, paragraph (8) is showing no light.

(4) Should there be a general failure of indication lights on the control panel, the latter cannot be relied upon to give a correct indication of the occupancy of track circuits and the Signalman must carry out the provisions of Track Circuit Block Regulation 13 (b).

General
Failure of
Indication
Lights

(5) The audible warning associated with the POINTS and the SIGNAL LAMPS indications should be tested periodically by operating the switch for a moment to the indication which is not illuminated.

Testing of
Audible
Warning

(6) Attention is drawn to Rule 67 (a) as to the necessity of ensuring that lever catches are firmly down as the interlocking between levers and signals controlled from the panel will not be free to operate unless levers are placed fully normal or reverse as the case may be.

Mechanical
Levers

OPERATION OF HAND CRANK RELEASE INSTRUMENT

Before the person appointed to operate the points by hand attempts to remove the hand crank from its instrument, he must communicate with the Signalman by means of the telephone provided.

If permission is given for the hand crank to be removed from the instrument, the hand crank should be rotated through 180 degrees in an anti-clockwise direction as soon as the needle indicator situated above the hand crank is deflected to the right. When the hand crank has been so rotated, it should be withdrawn by removing it horizontally from the instrument.

When use of the hand crank is no longer required, it should be returned to the instrument in the opposite manner to that described in the above paragraph, following which the Signalman must be advised that this has been done.

The person who has restored the hand crank to the instrument must not leave until he has received an assurance from the Signalman that everything is working normally.

Should a fault occur such that the electrical release of the hand crank is ineffective, and a key is accordingly issued by the Signalmen to the person appointed to operate the points by hand (see Description and Method of Operation of the Signalling Control Panel—Part 2—Method of Operation—Clause 13, page 7), the latter must insert the key into the keyhole situated below the needle indicator and turn it. This action enables the hand crank to be withdrawn as described above. When the hand crank has been restored to its instrument, the key should be removed from the keyhole and returned to the Signalman.

No undue force must be used when withdrawing the hand crank from or inserting it into the instrument.

The cupboard which houses the hand crank instrument must be kept locked at all other times.

BISHTON CROSSING GROUND FRAME

Bishton Crossing Ground Frame has a wheel working the level crossing gates and two levers, thus:

Lever No. 1 Interlocking Lever.

Lever No. 2 Gate Lock Lever.

The Ground Frame is in telephone communication with MAGOR Signal Box.

To operate the gates for road traffic:

- (i) Inform the Signalman at Magor that a release of the gates is required;
- (ii) When the indicator above Lever No. 1 shows FREE, press the adjacent plunger and at the same time, operate the lever to the reverse position. (The plunger may be released after the initial movement of the lever);
- (iii) Place Lever No. 2 to the reverse position and operate the gate wheel in the usual manner.

To close the gates across the public road:

- (i) Close the gates;
- (ii) Restore Lever No. 2 to the normal position in order to lock the gates;
- (iii) Restore Lever No. 1 to the normal position.

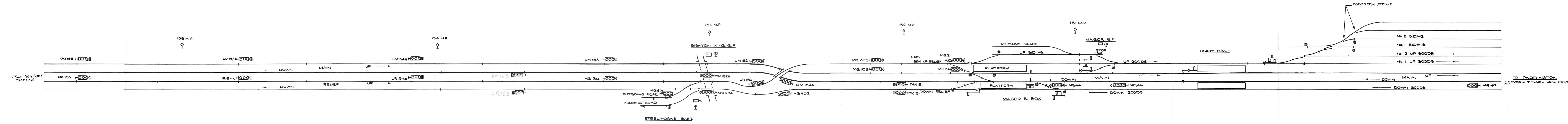
A plunger is provided to operate an emergency bell in Magor Signal Box. This bell must be operated immediately should an emergency occur affecting the safety of the line, and the Magor Signalman advised of the circumstances over the telephone as quickly as possible. The Crossing Keeper must also take all protective measures required by the rules.

This bell must be tested at 10.0 a.m. every day to ensure it is working correctly, and an entry made in the Occurrence Book.

NEWPORT
16TH APRIL, 1961

C. H. D. READ
District Traffic Superintendent

MAGOR



TO PADDINGTON
(SEVERN TUNNEL JCN. WEST)