



The **Signal Box Rule** manages two components for each signal box:

- A **signalman** in each signal box on the route:

The signalman has a 'camera' so that you can stand in the signal box and see what is going on outside. You can rotate your view using the arrow keys and zoom in and out using the mouse wheel or [Page Up] and [Page Down] keys. This is particularly useful when controlling shunting operations.

- A **Signal Box Control Panel (SBCP)** for each signal box:



This panel enables you to **monitor** and **control** the **signals** and **points** (junctions), **level crossings** and **turntables** connected to this signal box. It has three parts:

At the top, a Block Instrument (BI) and telephone for each line (single or double track) controlled by the box.

Then a 'Multi-function Control Panel' (MCP) which enables you to:

- move between different signal boxes on the route,
- control whether the signal box which you are in is simply monitoring or is controlling its signals,
- control a locomotive from the signal box.



At the bottom, a Track Control Panel (TCP) which enables you to control the signals, points (junctions), turntables and level crossing gates controlled by this signal box.

This Installation Manual describes the process of installing signalmen and the Signal Box Rule in routes and sessions. The procedures for operating signal boxes on a route and in a session are described in the Signal Box Operation Manual. You should be familiar with the Operation manual before reading this Installation Manual.

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1. Installing the Signal Box Rule in Routes and Sessions

The signal boxes controlled by the Signal Box Rule operate using the 'Absolute Block' system which was used extensively in many places around the world up to the introduction of modern computer controlled signalling systems which began in earnest in the 1970s and 1980s. It is still used in some locations.

The Absolute Block system is described in the Signal Box Operation Manual. **It is recommended that you become familiar with the Signal Box Operation Manual before attempting to install signal boxes using the Signal Box Rule in your own routes.**

In this manual the installation process will be described based on the 'PLL Signal Boxes' version of the Signal Box Rule <kuid2:96148:94001:13> and we will use some of the signal boxes installed on the Potteries Loop Line route as examples.

We would be pleased to hear about your experience of using the Signal Box Rule in the Potteries Loop Line route and sessions and on your routes and sessions. We will do our best to respond to any questions or issues which you may have. Contact us by way of the Potteries Loop Line website potteriesloopline.com.au or on one of the PLL threads on the Trainz Payware forum.

2 Adding Signal Boxes and Signallers to a Route

In order to add operational signal boxes to a route, you will need:

- one or more models of signal boxes which include the interior arrangement of the box and transparent windows

See Section 8 below for a list of suitable signal boxes supplied with the PLL Route package.

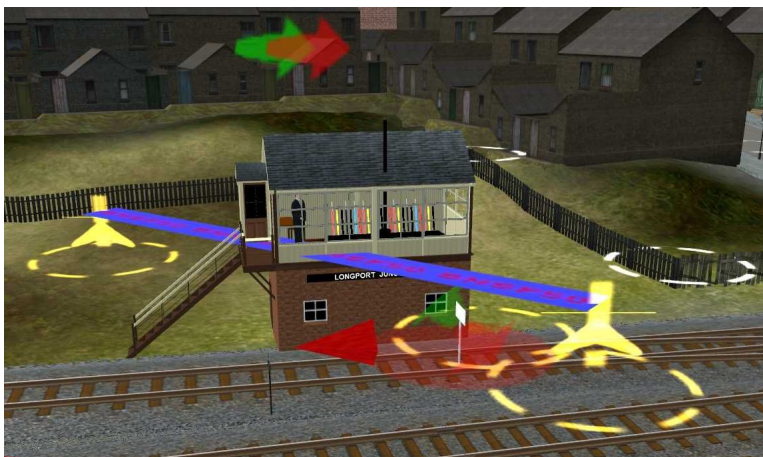
- a signaller who can be placed inside each signal box and who has a 'camera' attached
A signaller, <kuid:96148:95003:2>, supplied with the PLL package can be used with the Signal Box Rule.

2.1 Installing a Signal Box model:

Placement of each signal box model on the route requires some careful consideration. If the route is based on a real-world prototype, the box should be placed as close to the real-world position as possible. Slight adjustment might significantly improve visibility from inside the box. If the route is fictional, the box should be placed where it gives the best possible view of the points (junctions) under its control. It is helpful if all Starter and Home signals controlled by the signal box are visible from inside it. This may not always be possible and is not critical..

Name the model with the full name of its location: e.g. 'LONGPORT JUNCTION'.

2.2 Installing the Signaller: Once you have installed your signal box model, install a length of invisible track on which you can place the Signaller with his internal camera. (Trainz only allows cameras to be attached to vehicles, so the Signaller is actually a vehicle and needs a tack!) 'Invisible Track bnsf50' <kuid2:39134:101050:2> by bnsf50, is on the DLS and is particularly useful as it IS visible in Surveyor so that you can more easily get its position right.



The signalman faces along the track, so place the invisible track so that it is pointing in the direction that you want the signalman to face when you first want to view the route from his location. You can easily rotate his point of view during the session.

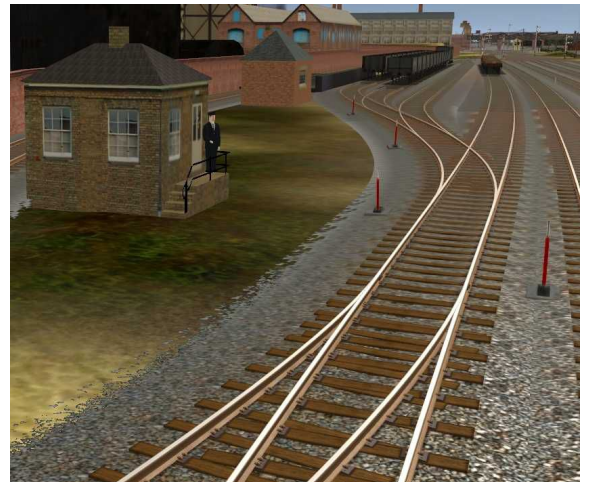
Adjust the height of the invisible track so that it is level with the floor of the signal box. In some cases you may find that this places the signalman's viewpoint directly in line with the central horizontal piece of the window frame which interferes with his view. This can be improved by raising the invisible track slightly, as shown in the accompanying illustration. Some experimentation will be necessary to obtain the best viewpoint for each box.

Place the Signalman on the invisible track inside the signal box. Move him along the track until you find the position which gives him the best view of his domain.

Each signal box is identified by a unique two or three character Signal Box Code: Longport Junction - LJ, Newcastle Junction - NC, Stoke MPD Coaling Tower - SSC. This code is used to as a prefix to identify all signals, points, turntables and level crossings controlled by a particular box.

Name the Signalman with the Signal Box Code for his box. In this case, 'LJ'

In some situations such as a group of industrial sidings or loco shed there may not be an actual signal box but in may be desirable to control this area as a whole. In this situation the signalman can be located in a position where he has a good view of the required operations, perhaps in or adjacent to a hut. In this case his 'signal box' will be set up as an 'Auxiliary' box which has control of points and shunting signals in the yard but has no block instruments or phones and does not control signals giving access to running lines.



3. Requirements for installing and naming signals, points, turntables and level crossings on the route

Before trying to set up a signal box for a location, it is important that **all** trackwork for the area to be controlled by the box is complete and all components named as described below. This will greatly simplify the process of configuring each signal box, reduce the amount of rework and greatly reduce the risk of configuration problems which are sometimes difficult to resolve. **If later changes are made, particular care must be taken to ensure that the signal box configuration data and the track arrangement and component naming are properly aligned. Failure to do this will result in failure of the Signal Box Rule to operate as it will be trying to operate something which it does not recognise or can't find!**

Signals and points are identified on real world railways by the lever numbers in the signal box which are used to operate them. If you are working from an actual trackwork and signal diagram you can use the numbers shown there for single points and for single arm/single light signals.

Trainz treats signal posts with multiple arms/lights as a single signal so these have a single identifier rather than a different one for each arm/light. A right junction signal with two arms might be referred to as LJ12.

When the Signal Box Rule is installed in a session it eliminates the need to use the Trainz red and green junction arrows to change points, the operation of which can be quite difficult in areas of complex trackwork and when a quick response is required. The Signal Box Rule enables junctions to be operated by clicking a button on the Signal Box Control Panel. To manage this task efficiently the Signal Box Rule treats single and double slip points as a 'Junction Group' consisting of two and four sets of points respectively.

We will illustrate and discuss these and a few other route setup requirements in more detail when we see how to set up the signal box track plan. You will need to take these requirements into account when you name the controlled items in your route, so **read the rest of this manual carefully before you finalise your route setup and before you commence signal box installation and configuration.**

If you do not have signal diagrams for the areas controlled by your signal boxes, you will find it helpful to produce one to aid signal installation and naming as you set up your route and to assist in Signal Box configuration. You may find the following guidance helpful:

- Draw the track plan from the point of view of the signaller looking out of the front of his box.
- Include all points controlled by this box.
- Add all the main line and shunting signals which you will require to safely control operations.
- Do not duplicate any identifiers of the points and signals for each box. Don't use the same number for a set of points and for a signal.
- Beginning at the left of the diagram, consecutively number all the signals needed to pass a train on the through lines from left to right. The first signal will normally be the Distant at the left and the last in this group will be the final starter to the right. This keeps all their levers together in a real box.
- Moving generally from left to right, number the points and remaining signals in order. Number signals which relate to particular points or sets of points close to those point numbers.
- Finally, number all the signals needed to pass a train from right to left. The last signal number will generally be the distant to the Right.
- While this numbering convention is not necessary for Signal Box Rule operation it does provide a simple method to arrange the signal box 'levers' in a logical manner as in the real world boxes.

The Signal Box Rule does NOT control Distant signals. These are allowed to operate automatically in response to the state of their associated Home signals. While you are not required to number these to support Signal Box operation, you may find it helpful to number them for completeness.

4 Adding the Signal Box Rule to a Session

As you will see below, setting up or configuring the Signal box Rule involves telling the Rule about each of the signal boxes on the Route which it must control, the relationship between those boxes and details of the signals, points, turntables and level crossings controlled by each signal box. That sounds like a big task but if it is done systematically it is straightforward, interesting and rewarding. You will know your route well when it is done!

Because the Signal box Rule only refers to assets which form part of a route, it needs to be set up only once for each route. Once this is done in one session it can be copied into all new sessions for the route. You may wish to create a session which only contains the Signal Box Rule. While this is not necessary it does mean that you will always know where the configured Signal Box Rule for the route can be found. If you make changes to the route during subsequent session development, you may be tempted to simply update the Signal Box Rule in the new session to match the changes. This can lead to problems particularly if you forget which sessions have the installation of the rule which is actually up-to-date. If you always make updates in one place the updated Rule can be copied into all your sessions relatively easily.

To begin setting up the Rule, choose two or three signal boxes which are next to each other on the route and enter the data for them as described below. Run the session in Driver, open the Signal Box Rule, check that you have a good view from each box, that you can operate all the signals, points, turntables and level crossing gates and that you can move from box to box without any errors being displayed.

If an error is notified it is most likely that something in the data which you have entered does not fully match the actual route. Because of the amount of data you need to enter, typing errors may arise. Check everything carefully. Once your initial boxes are error-free, add and test boxes one at a time. This makes any problems easier to find.

4.1 Adding the Signal Box Rule to a Session

When you have placed and name all signals, points, turntables and level crossings to be controlled by a particular signal box, click the 'Add' button to add the Signal Box Rule to the session:

Select the Signal Box Rule from the list of Rules:



The Signal Box Rule will be added to the session:



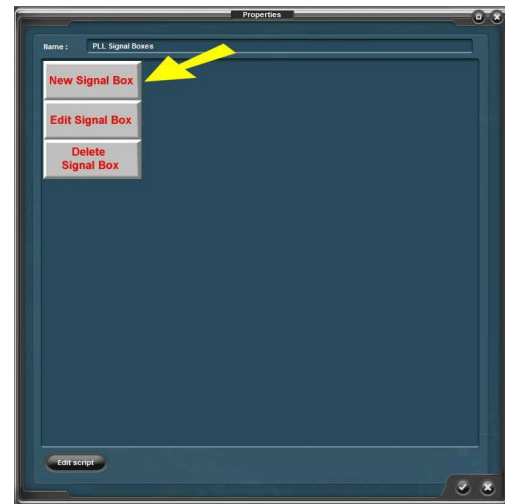
Click the 'Edit' button. This allows you to add or edit signal boxes in your session or to delete signal boxes from the Session.

Note that deleting a signal box from the session does not delete the model of the signal box from the route.

4.2 Adding a Signal Box to the Session.

Click the 'New Signal Box' button.

This will open a dialog box asking you to enter the Code for the new signal box.



A two or three-character code is required for each signal box. Examples might be 'LJ' or 'SSC'.

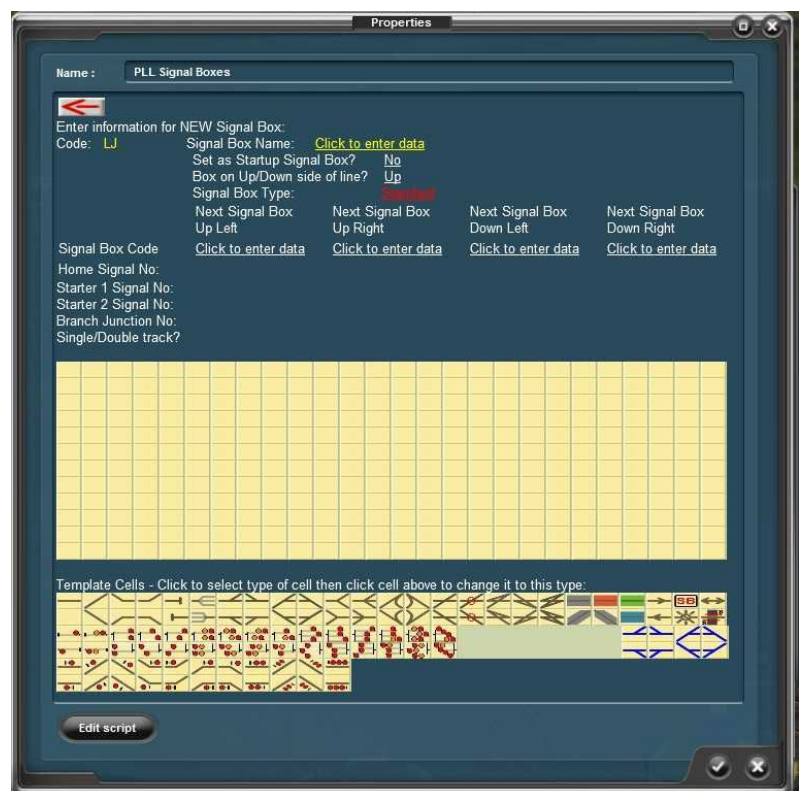
It is recommended that capital letters be used. Enter the code – 'LJ', for example, and click the tick button.

Once you have added signal boxes to your route, these can be edited or deleted using the other buttons here.

5 Configuring the Signal Box Rule for a Route

Once you have added the Signal Box Code, a 'blank' signal box setup template is displayed. We will now discuss entering the necessary information here in detail.

The red arrow at the top left allows you to return to the Add/Edit/Delete selector shown above, but **the data which you have entered is not saved until you click the tick button at the lower right corner of this panel.** If you have worked on several boxes and then click the tick button, all work on those boxes will be saved.



The following information is required to enable the signal box to operate:

5.1 Signal Box Name:

Enter the name of the new signal box – let's say 'LONGPORT JUNCTION'.

This name appears at the top centre of the Signal Box Control Panel in DRIVER.

5.2 Set as Startup Signal Box?

One signal box will always be set as the box to be loaded at the start of the session. The first signal box installed will be the 'Startup' box by default. Once there are more boxes installed, any box can be set to be the 'Startup' box by simply opening the setup template for the required box and clicking on the 'No' next to this question. The previously specified 'Startup' box will be set to 'No' automatically. **Be careful when deleting a signal box: If you delete the Startup box you will need to edit another box and set it as the Startup box.**

See section 7 below concerning the use of the 'Set Camera' rule to ensure that you are taken to the correct signal box at session start.

5.3 Box on Up/Down side of line?

From the very beginning it is important to know 'Which way is UP!'

The UP direction is towards the major city served by the railway – London, Sydney, etc. . . . In a fictional route you need to decide 'which way is up'. When a train is travelling in the 'Up' direction and it passes a signal box to its left, that box is said to be on the Up side of the line. If the signal box is on the train's left when the train is travelling in the Down direction, that box is referred to as being on the Down side of the line.

When standing in a signal box on the Up side of the line, the Up direction is to the left. When standing in a signal box on the Down side of the line, the Up direction is to the right. As you will see, it is important that this value is set correctly.

Click on the default 'Up' to toggle to 'Down' if necessary.

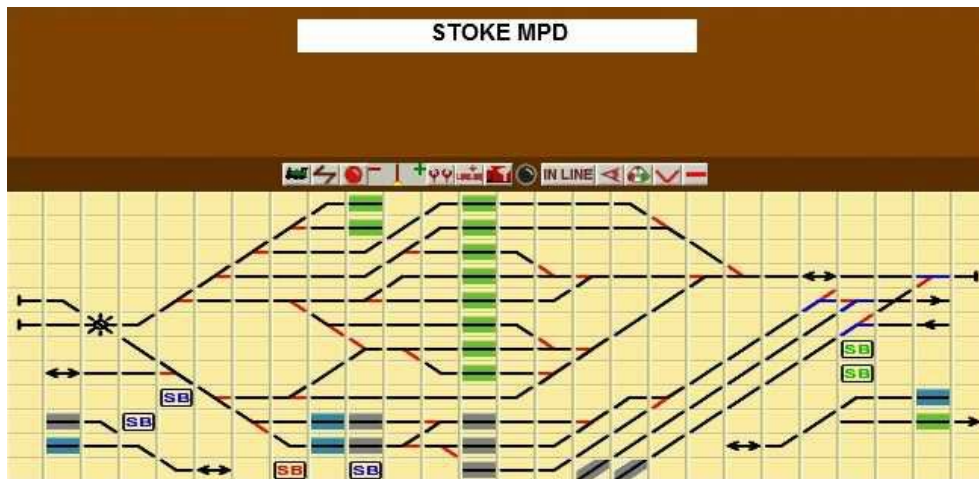
5.4 Signal Box Type?

The Signal Box Rule supports four types of signal box:

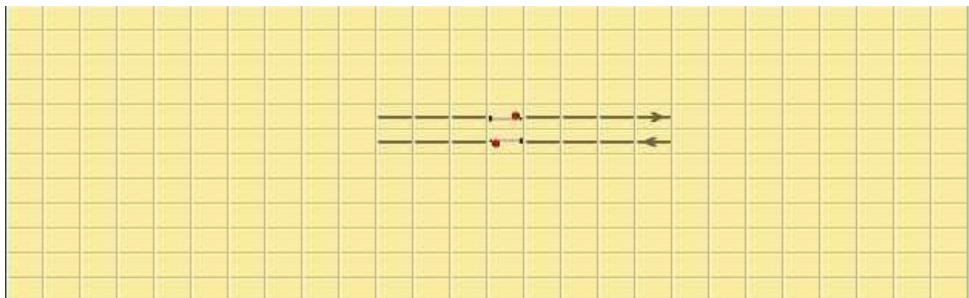
Standard: These signal boxes control and/or monitor points (junctions), signals, turntables and level crossings in a station yard area. They also have Block Instruments and telephones for communication with adjacent signal boxes. The LONGPORT JUNCTION signal box for which the Control Panel is shown below, is a Standard box. These are the most common type. There can be only one Standard box for each 'station yard' on the route



Auxiliary: These boxes do not have block instruments or telephones. They might control a complex set of points within a station yard, a loco shed or a group of industry sidings. They might also control shunting signals within their yard. They do not control signals giving access to running lines. The STOKES MPD signalman is an example. Here is his control panel:



Portal: These are located at portals. They monitor signals which you need to place at each portal and enable other boxes to know when trains enter or leave the portal, but do not control junctions and do not have a signalman camera, so you cannot (do not need to) view operations from them. They do not need a signal box model on the route but you can place one if you wish. **You must enter track plan information showing the signals for these boxes** The STOKES JUNCTION box is an example of this type. Here is the setup template for its Track Plan showing a Starter signal for trains leaving the portal and Home signal for trains entering it. You may wish to use 'invisible' signals at portals.



View Only: In large or complex station yards it may be impossible to see the whole area from one signal box. A 'View Only' box can be added to manage this situation. These boxes have a signalman camera but do not have a Signal Box Control Panel (SBCP). You can view operations from them while using the SBCP of the Standard box for that station yard. The STOKES COALING PLANT box [SSC] is of this type and is used with STOKES MPD box [SSM] as the Standard box for the loco shed.

Note that 'View Only' signal boxes only require a Name and their type to be set to 'View Only'. All other fields can be left at their default values.

Click on the currently set Signal Box Type (the default is 'Standard') to cycle through the available options.

5.5 Information about adjacent signal boxes:

Each signal box can be connected to adjoining signal boxes on four approaching lines, two from the UP direction [UP LEFT and UP RIGHT], two from the DOWN direction [DOWN LEFT and DOWN RIGHT].

The next section of the template contains information about each of these signal boxes adjacent to the one being set up.

	Next Signal Box Up Left	Next Signal Box Up Right	Next Signal Box Down Left	Next Signal Box Down Right
Signal Box Code	Click to enter data	Click to enter data	Click to enter data	Click to enter data
Home Signal No:				
Starter 1 Signal No:				
Starter 2 Signal No:				
Branch Junction No:				
Single/Double track?				

If this is an 'Auxiliary' or 'View Only' box it has no adjacent boxes so all four sets of 'Next Signal Box' information are left blank.

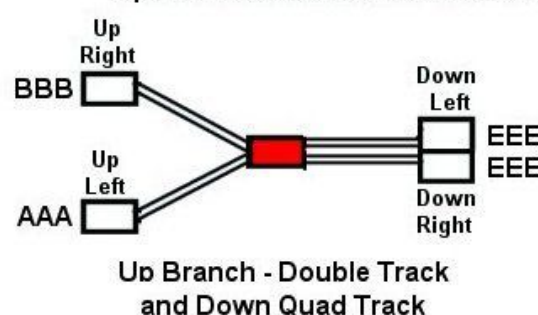
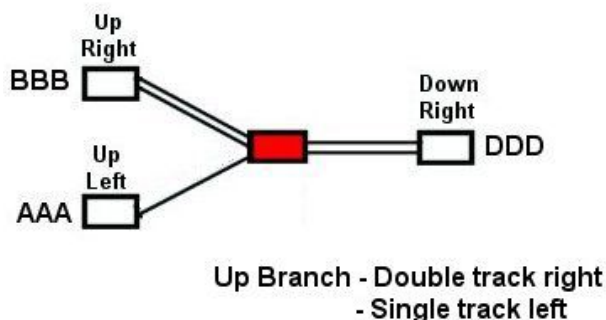
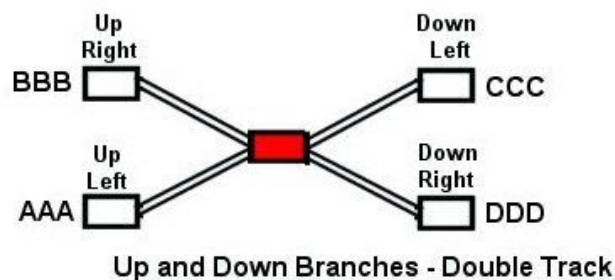
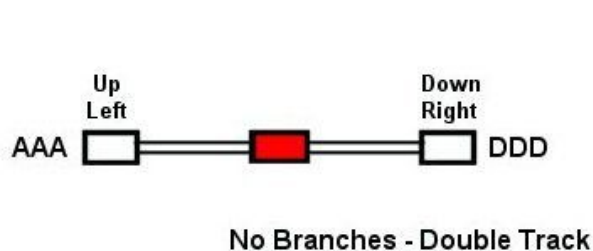
When setting up the Signal Box Rule, do not enter information about adjacent boxes and then attempt to view the box in DRIVER unless you have already entered corresponding data for the adjacent boxes. The Rule will be looking for information about a neighbouring box which does not yet exist and will show an error.

For your first box, enter 'Next Signal Box' information for one of its neighbours, then start setting up your second box and enter 'Next Signal Box' information for the first box. Then open Driver to view and test both boxes. Think of installing this information as plugging in the connecting cables to each adjacent box. As you add each successive box only enter 'Next Signal Box' information for already set up boxes and add the information for the new box to its previously set up neighbours.

A signal box at a terminus or at a portal will only have 'Next Signal Box' information in one direction.

5.5.1 Signal box Code:

The 2- or 3-character Signal Box Code for the next box on each line is entered in the space provided, as shown on the template.



Note that information about adjacent boxes is not affected by the side of the line on which the signal box model is placed. To work out which adjacent box information should be placed in each location, simply stand in the middle of the track in front of your signal box and look in the Up direction. If there is a branch in that direction

it will be obvious which next box is to the left and which is to the right. Then turn around and face the Down direction and repeat the exercise!

A signal box can control a four track line from each direction, simply by entering the same code for both the left and right adjacent boxes in that direction. You need to be careful to ensure that each box on the four track section has its tracks connected properly to the adjacent boxes! The Down Left tracks from one box are the Up Right tracks from its neighbour in the DOWN direction, and so on. This is reasonably straightforward when the four tracks are arranged up/down/up down but can become confusing with the up/up/down/down arrangement.

If the box has only one adjacent box in each direction, enter the codes of these boxes in the 'Up Left' and 'Down Right' positions.

5.5.2 Home and Starter Signal Information:

The Signal Box Rule operates the Block Instruments and phone messages by monitoring the state the starter signals for the next two signal boxes on each approaching line and the home signals for the next boxes on each departing line, as well as the state of the present box's home and starter signals. By identifying which signal box is on each branch and in each direction from each signal box, and by identifying each box's home and starter signals on each branch, any box can determine which of its neighbours' signals it must monitor.

We have already identified the neighbouring signal boxes. We now need to identify our box's home and starter signals on each line.

We will use the template for LONGPORT JUNCTION to illustrate the entry of signal information.

	Next Signal Box Down Left	Next Signal Box Down Right	Next Signal Box Up Left	Next Signal Box Up Right
Signal Box Code:	BS	PJ	Click to enter data	LP
Home Signal No:	LJ2	LJ8		LJ32
Starter 1 Signal No:	LJ31 Straight	LJ29 Mono		LJ3 Mono
Starter 2 Signal No:	Click	Click		LJ9 Mono
Branch Junction No:	LJ12b Right	Click		LJ16 Both
Single/Double track?	Double	Single		Double

Home signals are relatively easy. There will always be a single home signal protecting the box's home section on each approaching line. If two branches are approaching, the home signals will generally be in rear of the junction, protecting it. As shown above, the home signals are as follows:

- From Bradwell Sidings: 2
- From Pinnox Junction: 8
- From Longport: 32

Simply click '[Click to enter data](#)' and enter the signal number in the box that opens. You do not need to enter 'LJ'.

Starter signals can be more complicated.

Beginning with the line to **Bradwell Sidings [BS]**: This has four tracks but only the centre fast lines are controlled by block instruments. The goods lines running outside the fast lines are controlled by 'Traffic Notice' as described in Section 7 below. The Starter signal for the fast line to Bradwell Sidings is 31, but only the 'Straight' arm of that signal, and only when the points which signal 31 protect - the 'Branch Junction' for that

signal - 12b - are set RIGHT. This information is entered as shown above. There is no second starter so this field is left at 'Click' - i.e. blank.

Once this information is entered, adjacent boxes on this line will only respond to the state of the straight arm of this signal and then only when junction 12b is set right. Otherwise this signal will not be 'visible' from adjacent boxes.

When you enter a signal or junction number, the default direction setting will be displayed:


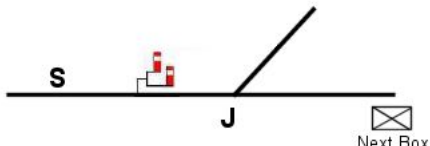
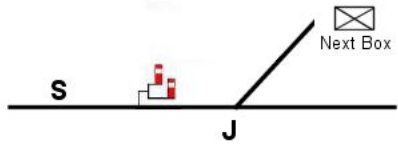
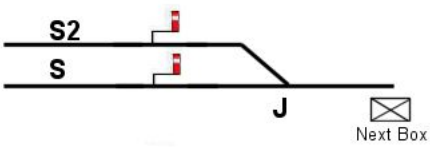
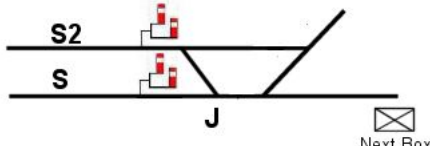
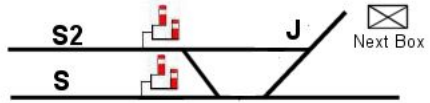
- 'mono' for signals indicating that they have only one arm/light;
- 'right' for Branch Junctions.

Click on these values to select from the available alternative values.

The starter for the line to **Pinnox Junction [PJ]** is simply 29. It is tagged 'Mono' as it has a single starter arm; the Distant arm is controlled by the PJ box. There is no second starter and no junction associated with this signal.

There are two starters for the line to **Longport [LP]**, signal 3 for trains from Bradwell Sidings; signal 9 for trains from Pinnox Junction. These are both single arm 'Mono' signals and the Longport box needs to pay attention to whichever of them is made 'visible' to it by the setting of junction 16. Hence both directions of Junction LJ16 need to be monitored. This information is entered as shown above.

The following table shows typical examples of the data entries required for various configurations of starter signals:

Starter Signal setup:		
	Starter No:	S
	Starter 2 No:	Click
	Branch Junction No:	Click
	Starter No:	S
	Starter 2 No:	Click
	Branch Junction No:	J
	Starter No:	S
	Starter 2 No:	Click
	Branch Junction No:	J
	Starter No:	S
	Starter 2 No:	S2
	Branch Junction No:	J
	Starter No:	S
	Starter 2 No:	S2
	Branch Junction No:	J
	Starter No:	S
	Starter 2 No:	S2
	Branch Junction No:	J

5.5.3 Single or Double Track?:

Each of these lines might be either single or double track. Once a code is entered, by default it will be considered to be on a single track line. Simply click 'Single' to toggle to 'Double' if required.

5.6 Entering the 'Track Plan' controlled by the Signal Box:

The blank tiled area of the setup template will contain the track plan and signal position information for the station yard controlled by the signal box.

This track plan should be laid out so that, when standing in the box, junctions and signals to your left are on the left of the plan and those to the right are on the right. It should be a 'birds eye view' when looking from the front of the signal box. This will make operation easy and intuitive.

Before entering any data into this panel, you should complete a Signal Box Installation Template. (A master for printing these is on the last page of this manual) It might take several attempts to get the layout of the area controlled by the box mapped out to fit in the 26 by 12 tile panel shown above.

Here is a filled-in Installation Template for the LONGPORT JUNCTION signal box.

Signal Box Installation Template:

Box Code: LJ Box Name: LONGPORT JUNCTION

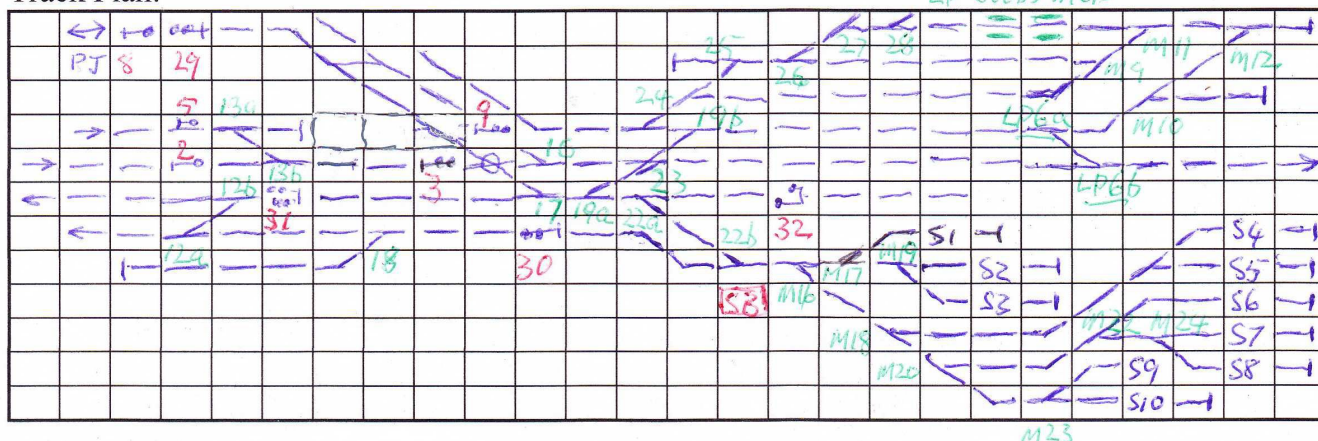
Startup Box? Yes / No Side of Line? UP / DOWN

Box Type? Standard / Auxiliary / View-Only / Portal

Next Boxes: Up Left: Up Right: Down Left: Down Right:

Box Code:	BS	-	PJ	-	-	-	LP	-
Home Signal:	2	-	8	-	-	-	32	-
Starter Signal	21	STRAIGHT	29	-	-	-	3	MONO
Starter 2 Signal	-	-	-	-	-	-	9	MONO
Branch Junction	126	RIGHT	-	-	-	-	16	BOTH
Single/Double track			5				D	

Track Plan:



Here is an ‘aerial view’ in Driver of a section of track controlled by the LONGPORT JUNCTION signal box. The Signal Box Control Panel is shown at the bottom of the screenshot.



Setting up the Track Plan:

The ‘Track Plan’ for the box is built up by simply clicking the required ‘Template Cells’ below the Track Plan panel – the selected cell will change colour – and then clicking the cell in the Track Plan panel which needs to be of that particular type.

The following track elements are provided:

5.6.1 Track:



These are simple track elements. They have no function other than to illustrate the track arrangement. The ‘blank’ cell can be used to delete a cell from the Track Plan panel.



When added to the Track Plan a dialog box allows you to add a name. This is particularly useful when there are two lines departing from a signal box in the same direction. Do not leave spaces when entering location names. Use ‘_’ instead.



These represent ‘Dead Ends’ or buffers.



These represent ‘Yards’ which are not controlled by this Signal Box. They are either manually controlled or may be controlled by an ‘Auxiliary’ signal box. Their main purpose is to save space on the track plan.

5.6.2 Points



These are Single Points or Junctions.

When you select and enter a set of Points (Junctions) into the Track Plan panel, a dialog box will open and ask for the 'Junction Group Number'. For these single points/junctions this is simply the part of the Junction Name in the route following the Signal Box Code.

IMPORTANT NOTE: All junctions in the route which are to be controlled by signal boxes must be named in the format 'XXXn' or 'XXn', where 'XXX' or 'XX' is the Code of the controlling signal box and 'n' is the individual junction number. Example: LJ31. This junction number will be displayed as a tooltip in the Track Plan. If single junctions – for example the two junctions which form a crossover – are numbered LJ12a and LJ12b on your route, you can enter '12a' and '12b' as the Junction Numbers.



These icons are used to represent points which belong to another signal box but are added to the track plan of this box for convenience of operation during sessions.

When entering the description of any of these 'foreign' junctions you need to include the full signal box code to which they belong and the particular junction number, for example 'LP6a' and 'LP6b' which are included in the track plan for the Longport Junction box.

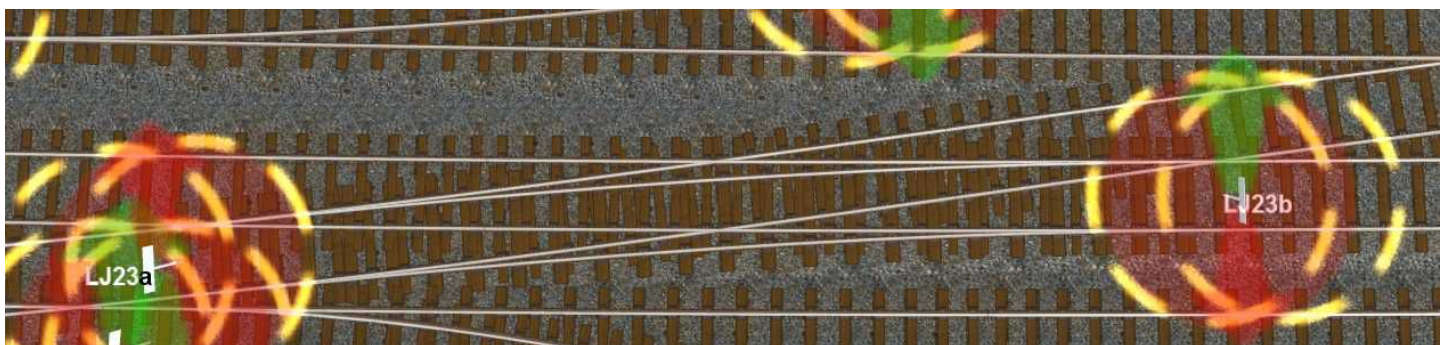
The following sets of track elements are referred to as Junction Groups. Each contains a number of junctions which must be precisely named so that they operate correctly together.



These are Single Slips. There are three possible paths through this Junction Group.

Single slips are made up of two junctions forming a Junction Group, with a common Junction Group Number 'n'. The left junction, whichever track it is on, has the name format 'XXna' or 'XXXna' and the right junction has the name format 'XXnb' or 'XXXnb'.

Here is an example: LJ23a and LJ2N3b form Junction Group '23'.



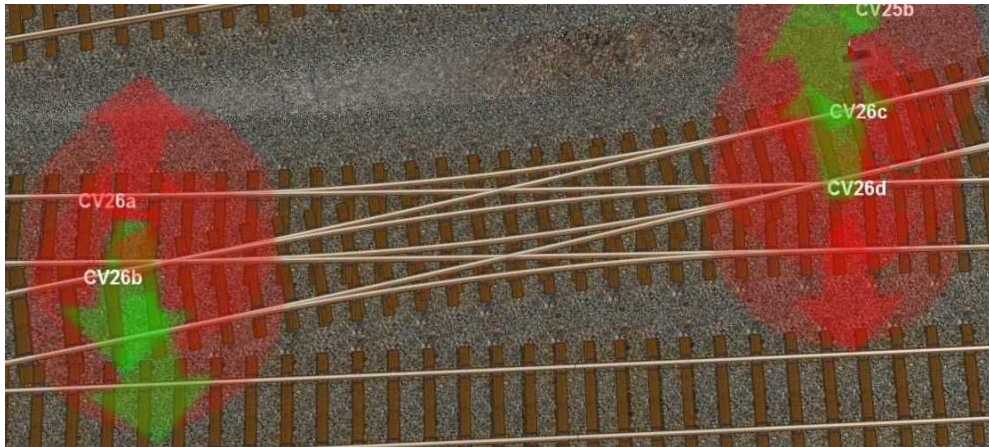
Set the default direction of each junction to provide your required default path. Here LJ23b is set 'RIGHT' and LJ23a is set 'LEFT'. A train passing through LJ23a from right to left will pass through the junction. A train attempting to pass through LJ23a will be blocked (or derail!)

Again, simply enter the Junction Group Number in the dialog box when adding a single slip to the Track Plan.



These are Double Slips. There are four possible paths through these Junction Groups.

Similar to Single Slips, junctions in a Double Slip Junction Group have a set naming convention. When looking down on the double slip in the route from above, facing in the same direction as the signalman standing in the box and looking out the front windows, the left junction closest to the top of the screen has the name format 'XXna' or 'XXXna' and the one closest to the bottom of the screen 'XXnb' or 'XXXnb'. The right Junction closest to the top of the screen has the format 'XXnc' or 'XXXnc' and the other 'XXnd' or 'XXXnd'. Here's a picture:



Note the default junction settings for the 'Through' track.

5.6.3 Diamond Crossings present an issue.

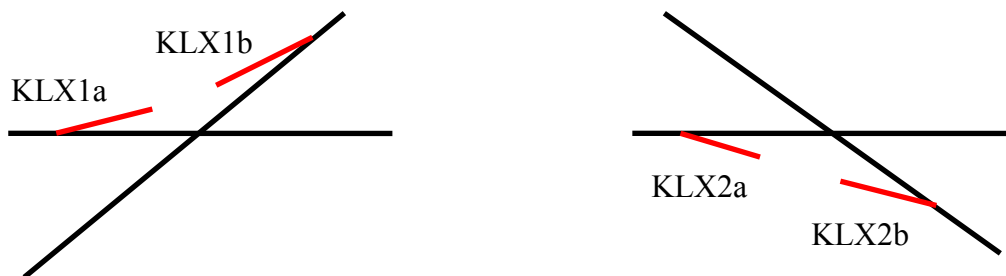
Trainz does not recognise that two tracks which cross one another are connected in any way. This means that one train can simply 'drive through' another at a diamond crossing without colliding. This also means that there is no inbuilt mechanism in Trainz preventing two signals protecting a diamond crossing from both showing 'Clear' at the same time.

You may choose to manage this situation by planning your session design in such a way that two trains do not arrive at diamond crossings at the same time. You can also use driver commands in your train schedules to set and release signals which will protect your trains' passage through diamond crossings. This latter approach is used in the PLL Route. We might refer to this approach as using 'passive' diamond crossings.



If you are using 'passive' diamond crossings, these are represented on the track plan using these icons. These are simply two independent track sections. The red circle indicates that the crossings do not have inbuilt 'protection'.

To prevent the 'drive through' situation described above, particularly when using signal box control, diamond crossings can be installed as 'Switched Diamonds'. This involves installing two junctions to protect the diamond crossing as shown here:



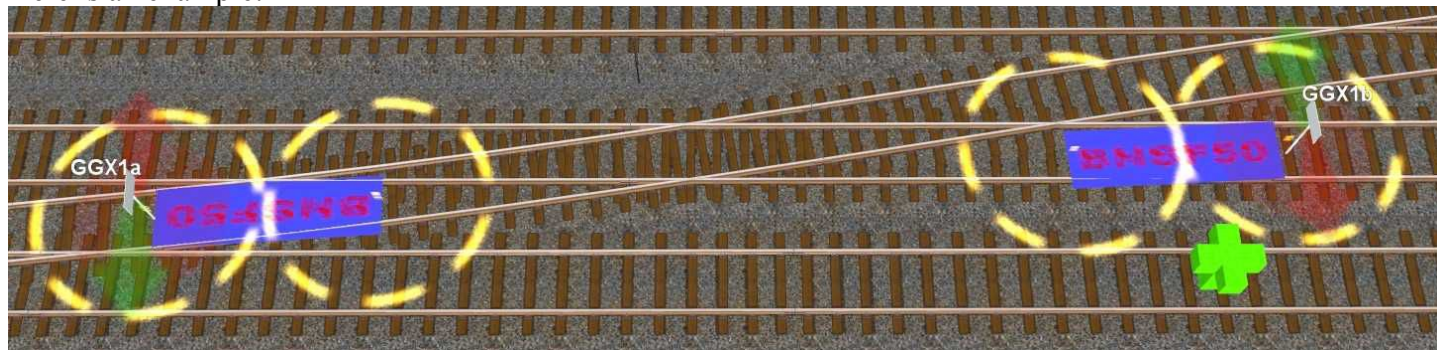
We can refer to these as 'switched diamond crossings'.

Note that, when viewed from the signal box, the left junction ends with 'a' and the right ends with 'b', Together the junctions in the left hand diagram form 'Junction Group X1', and those to the right form 'Junction Group X2' - they are treated by the signal box as a single junction, so that when a diamond crossing is added to the

Track Plan, it is only necessary to enter the Junction Group Number in the dialog box: in these cases, 'X1' for one and 'X2' for the other. Using this notation helps to distinguish switched diamond crossings from other Junction Groups, but is not mandatory..

These switched diamond crossings behave just like a single slip but the stub ends of the branching tracks are not joined and invisible track is used for the branching tracks.. Note that the invisible branches should only diverge slightly from the visible tracks so as not to distort the visible track layout. Both junctions are always set in the same direction so that only one clear path is available through the junction.

Here is an example:



When installing these junctions you will need to set the default direction which you want to be set 'CLEAR'. The default direction for each junction should be the same; either 'both left' or 'both right'. Note that both junctions are set RIGHT in the above diagram so that the through track is clear but the crossing track is blocked. These junction settings will cause protecting signals to behave appropriately.



These icons are used for Switched Diamond Crossings. There are two possible paths through these Junction Groups

5.6.4 Signals



These icons are used to represent main line signals.

The top row icons are used to represent signals facing trains moving from left to right.

The bottom row are used to represent signals facing trains passing from right to left.

Signals are named in the same format as points/junctions. The same sequential number must not be repeated in a signal box.

When you select and enter a signal into the Track Plan panel, a dialog box will open and ask for the 'Signal Number'. Do not include the signal box code



These icons are used to represent shunting signals.

The location and operation of signals is described in more detail in Section 2.1.2 of the Signal Box Operation Manual.

5.6.5 Other Infrastructure



These are 'nameable' track elements. They can be used to make elements of the Track Plan easier to identify.

When you add one of these to the Track Plan, a dialog box will allow you to name it. For example, you might use the red cell for passenger platforms, green for goods sheds, grey for sidings etc.

Note that spaces are not permitted in these names. If you include a space, only the characters to the left of the first space will be displayed in the tooltip. You need to enter 'Goods_Shed' for 'Goods Shed'.



This icon is used to represent a turntable.

If there is only one turntable controlled by a signal box it can be numbered 'XXTT' or 'XXXTT' where XX or XXX is the signal box code. If there is more than one turntable, they can be numbered XXTT1, XXTT2 etc. Note: Only enter 'TT', 'TT1' etc in the dialog box.



This icon is used to represent a level crossing with gates.

If there is only one level crossing controlled by a signal box it can be numbered 'XXLX' or 'XXXLX' where XX or XXX is the signal box code. If there is more than one level crossing, they can be numbered XXLX1, XXLX2 etc. Note: Only enter 'LX', 'LX1' etc in the dialog box.

If a level crossing crosses more than one track, place this icon on each track and use the same name for each icon so that the gates will be operated when any of the icons are clicked in Driver.



Use this icon to represent the location of your signal box. Also place a signal box icon on the track plan for any 'Auxiliary' or 'View Only' signal boxes closely related to the operation of the current box. These icons provide access to these associated boxes.

Signal Box icons are not required for Portal boxes as described in Section 5.4 above]

These Signal Box icons appear in different colours in Driver, as described in the Section 2.1.5 of the Signal box Operation Manual. These colours are determined by the Signal Box Type value entered previously. They are all red in Surveyor.

Remember to select the 'Tick' icon when exiting both the Signal Box and Rules boxes to save your work!!

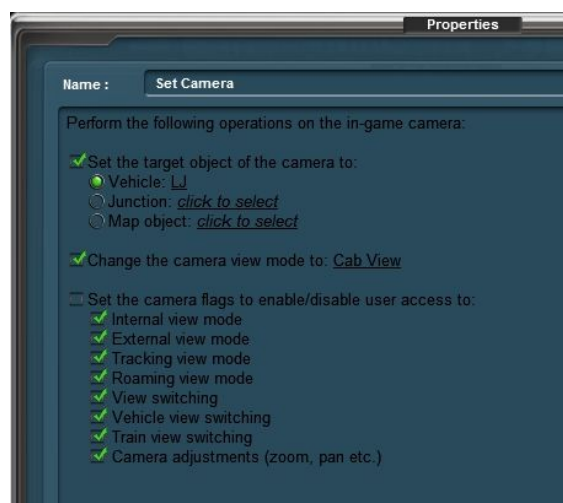
6 Setting up sessions when using the Signal Box Rule

Set Camera:

If you want to start a session from within a signal box, add the 'Set Camera' rule to the session. Set the target object to 'Vehicle' and enter the Signal Box Code for the box you want to start in. You must also set this as the 'Startup' signal box in the signal box Rule as described in section 5.2 above. Set the camera view mode to 'Cab View' and the setup is complete.

Traffic Notices:

The Traffic Notice driver command is described in section 2.4 of the Signal Box Operation manual. It allows signal boxes to be notified of the approach of trains from lines or yards which are not part of the main line system



6. List of Signal Box installation assets

Signal Box Rule	
PLL Signal boxes	<kuid2:96148:94001:13>
Signalman	
Signalman	<kuid2:96148:95003:2>
Signalman - Invisible	<kuid2:96148:94021:1>
Invisible track	
Invisible Track bnsf50	<kuid2:39134:101050:3>

Signal Boxes provided with the PLL package

PLL SB Nameable 01 Gable Roof Brown	<kuid:35412:28510>	mike10
PLL SB Nameable 01 Gable Roof Cream	<kuid:35412:28497>	mike10
PLL SB Nameable 01 Hipped Roof Brown	<kuid:35412:28507>	mike10
PLL SB Nameable 01 Hipped Roof Cream	<kuid:35412:28513>	mike10
PLL SB Nameable 02 Gable Roof Cream	<kuid:35412:28498>	mike10
PLL SB Nameable 03 Gable Roof Cream	<kuid:35412:28499>	mike10
PLL SB Nameable 04 Gable Roof Cream	<kuid:35412:28500>	mike10
PLL SB Nameable 05 Gable Roof Brown	<kuid:35412:28511>	mike10
PLL SB Nameable 05 Gable Roof Cream	<kuid:35412:28501>	mike10
PLL SB Nameable 05 Hipped Roof Brown	<kuid:35412:28508>	mike10
PLL SB Nameable 05 Hipped Roof Cream	<kuid:35412:28514>	mike10
PLL SB Nameable 06 Gable Roof Brown	<kuid:35412:28515>	mike10
PLL SB Nameable 06 Gable Roof Cream	<kuid:35412:28502>	mike10
PLL SB Nameable 06 Hipped Roof Brown	<kuid:35412:28509>	mike10
PLL SB Nameable 07 Sloping Roof Cream	<kuid:35412:28503>	mike10
PLL SB Nameable 08 Gable Roof Brown	<kuid:35412:28512>	mike10
PLL SB Nameable 08 Gable Roof Cream	<kuid:35412:28504>	mike10
PLL SB Nameable 09 Gable Roof Brown	<kuid:35412:28516>	mike10
PLL SB Nameable 09 Gable Roof Cream	<kuid:35412:28505>	mike10
PLL SB Nameable 10 Gable Roof Cream	<kuid:35412:28506>	mike10

Traffic Notice' Driver Command	<kuid2:96148:94030:1>
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Signal Box Installation Template:

Box Code:_____ **Box Name::**_____

Startup Box? Yes / No **Side of Line?** UP / DOWN

Box Type? Standard / Auxiliary / View-Only / Portal

Next Boxes: Up Left: Up Right: Down Left: Down Right:

Box Code:								
Home Signal:								
Starter Signal								
Starter 2 Signal								
Branch Junction								
Single/Double track								

Track Plan:

[illegible]