Signal Enhancement Pack

AP

Contents

How to Install

1) Locate where you have downloaded this pack and unzip it. Information on how to do this can be found *here*.
2) Go to the location where you have extracted the files from the .zip file.
3) Now find the .exe file called 'Signal Enhancement Pack'. Double-click this file.
4) Follow the steps and by the end of the process, this pack will have installed.

AP

Visuals

The visuals of the colour light signals supplied with the supported routes have been vastly improved.
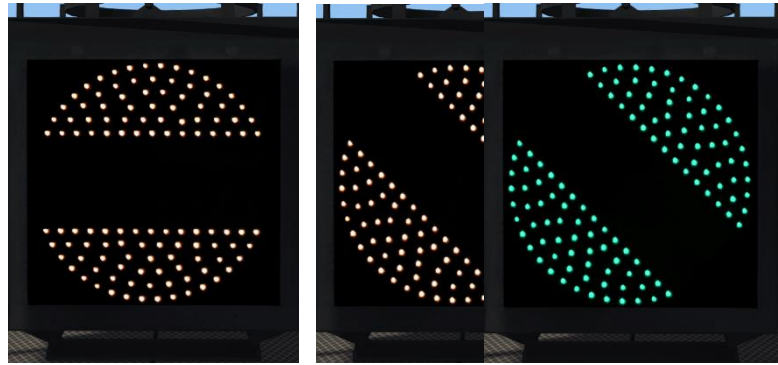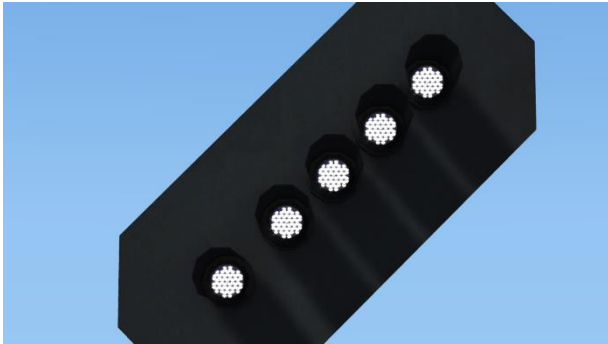
Aspects

Incandescent

LED

Banner Repeater

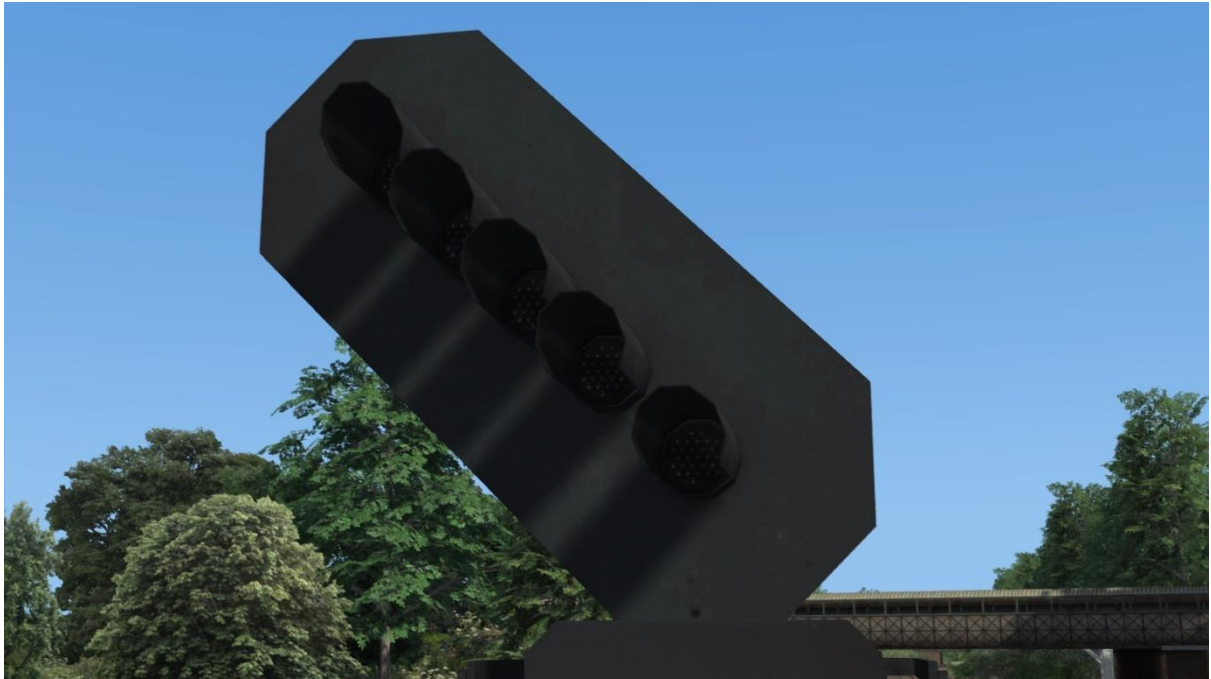# Heads

Old

Modern

Feathers

Old

Modern

Posts

Features

Overlap

This pack simulates the overlap between the signal itself and when the track circuit beyond the signal activates, reverting the signal to danger.

Our research suggests it is most common for the overlap to be around 20 to 50 metres on control signals and anything from 20 to 260 metres on automatic signals.

With this in mind, upon loading the simulator, a random overlap length is allocated to each signal using these values. With the passing of every signal then, it will always vary on when exactly it reverts to danger.

Please note that this is a purely visual effect and the simulator will still think you have passed a signal as soon as you pass it physically. This is to ensure existing scenarios are not broken by changing the core working of the signalling. Also, once passing the signal, the aspect displayed is frozen until it reverts to danger. If you have passed a red light, you will need to reverse back behind the signal to see the correct aspect.

Control signals are signals manually controlled by the signalman, usually found on stretches of track where this is a junction ahead of the signal in question.

Automatic signals will automatically show a proceed aspect without signalman intervention and are denoted by white and black stripes above the identity plate.

Aspect Sequence

On many signalling installations, when a signal 'steps up' by more than one aspect such as red to double yellow, yellow to green or red to green, you will briefly see the intermediate aspects as the relays open/close. This has been simulated in this pack.

Also, to represent signal-to-signal differences, a random factor is allocated to each signal upon scenario load which varies the speed at which the signal cycles through each aspect. Also, there is a 20% chance that you won't see any sequence at all and the aspect changes instantly.

Finally, if a route indicator or theatre box is illuminating, this will appear before the main aspect changes. There is a 50/50 chance of this delay being very short or 2.5 seconds long. This chance is decided upon scenario load on a per signal basis.

All of the above is observed from real-world behaviour.

Incandescent Bulb Fade

A distinctive quality of traditional incandescent bulb signals is the way the aspects fade in and out rather than illuminating instantly. This has been simulated in this pack and is particularly satisfying to observe on flashing yellow aspects.

Projected Light

At night and 30 minutes before sunrise/after sunset, signals will now emit light that illuminates objects in front of them.

For the more realistic appearance of light during dawn/dusk, the brightness of the light is steadily reduced from night to 30 minutes before sunrise and vice versa at dusk. This is instead of it instantly turning on/off at a pre-described time.

LED signals have a narrower spread of light and emit more light than the dimmer/more dispersed incandescent variants.

Please note that projected light will only emit when a train is 150m in advance of a signal, to when the rear of the train has passed 100m beyond the signal. If light was to shine continually, you would routinely have light shining into the cab from signals facing the opposite direction on the opposite line. To solve this, the light could be set to cast shadows but this has too high a performance hit to be worth it.

Approach Control

Overview

One aspect of signalling that has been a constant source of frustration in the simulator, and is the primary motivation for producing this pack, is the lack of realistic approach control. This is where adverse signals are given to a driver so they are given sufficient warning to slow their train before negotiating a diverging (lower speed) route.

The default approach control implementation gives only two approach control types, either flashing yellows or a simple yellow at the junction signal with a double yellow preceding it in 4 aspect areas, aka, 'Release from Yellow'.

These are both simulated correctly except for the junction signal not 'stepping up' (clearing to double yellow or green as the number of clear blocks ahead allow) as the train nears it. The single yellow option is also probably the least common approach control type so to have that as the only alternative to flashing yellows is limiting. It also provides far too little warning if approaching a junction with a significantly lower speed than the main route speed which results in a severe overspeed or even derailment.

Types

Upon installing this pack, four types of approach control are now possible, all simulated as realistically as possible for route builders and scenario creators to utilise.

Release from Red

- Primarily used on lower speed junctions of 30mph or less.

- Aspect sequence is double yellow > yellow > red on the junction signal, which then steps up (clears) to the relevant aspect as the number of clear blocks ahead allow.

- The signal will step up at the AWS magnet.

Release from Red/Yellow

- Primarily used on higher speed 40/50mph junctions.

- Aspect sequence is double yellow > yellow > red on the junction signal, which then steps up to yellow as soon as the signal is visible, and then to green as the train draws nearer, if sufficient blocks are clear ahead.

- For the signal to step up to yellow, the approaching train must have passed the signal in advance of the junction signal and be less than 800m from the junction signal. If the junction signal has a theatre box, this reduces to 250m.

- The signal will step up to green, clear blocks ahead allowing, at the AWS magnet.

Release from Yellow

- Often used where the speed reduction required to take the diverging route is not sizeable (20mph or less) and that giving the driver a double yellow beforehand is sufficient for them to slow accordingly.

- Aspect sequence is double yellow > yellow on the junction signal, which then steps up to green, clear blocks ahead allowing.

- The signal will step up at the AWS magnet.

Flashing Yellows

- Primarily used on high speed 50mph+ junctions.

- Aspect sequence is flashing double yellow > flashing yellow > yellow on the junction, which then steps up to green, clear blocks ahead allowing.

- The signal will step up when 450m away from the junction signal. This is further in advance so as to allow the driver to keep as much speed up as possible.

Whilst these four options are now available to route and scenario creators using this pack, we have had to choose two of these for existing routes to use.

Where existing routes used flashing yellows, this remains the same. The only benefit being the 'stepping up' of the junction signal as the train nears it.

Where existing routes used 'Release from Yellow', they will now use 'Release from Red/Yellow' which strikes a good balance between reducing the train's speed for a low speed crossover but also giving good notice of whether the route is clear beyond the junction signal.

Customisation

By default, two types of approach control can be simulated but what about the other two; 'Release from Red' and 'Release from Yellow'? This is where editing signals in the route editor or placing track markers in the scenario editor comes in, which allows you to select the type of approach control and at what distance the junction signal will 'step up'/release.

Route Editor

DISCLAIMER: This section assumes prior knowledge of how signal placement in the route editor works. We only advise on and support the additional features that are provided in this pack.

To customise the approach control of a signal in a route, you must double click it in the route editor and go to the right-hand fly-out menu. Then find the type of approach control you would like to implement below and follow the instructions.

Release from Red

Input **;AC=R** after the signal number and ensure the 'Limited Aspect' box is ticked on the links you would like this approach control type to apply to.

Release from Red/Yellow

Ensure the 'Limited Aspect' box is ticked on the links you would like this approach control type to apply to.

Release from Yellow

Input **;AC=Y** after the signal number and ensure the 'Limited Aspect' box is ticked on the links you would like this approach control type to apply to.

Flashing Yellows

Ensure the 'Approach Control' box is ticked on the links you would like this approach control type to apply to.

Release Distance

The distance from the junction signal at which it 'steps up' to a double yellow or green aspect (clear blocks ahead permitting) can also be amended. To do this, input **;D=x** after the signal number. **x** is the value of your desired release distance in metres.

In addition, to amend the distance at which a junction signal changes to yellow when using 'Release from Red/Yellow', input **;D2=x** after the signal number. **x** is the value

of your desired release distance in metres. Note that this value should always be greater than the value at which the signal will release to double yellow/green.

Limitations

Please note that on one signal, you can only use 'Flashing Yellows' or one of the other three types of approach control. You cannot for example have 'Release from Red' on one link and 'Release from Red/Yellow' on another link.

Also, if a custom release distance is specified, this will apply to all links with an approach control type selected. You cannot have different release distances for different links.

Scenario Editor

To customise the approach control of a signal in a scenario, place a special track marker by following the instructions below:

1) In the left-hand rolling stock fly-out, click the object set filter which looks like a blue box with an orange arrow to the right of it.

2) Go to the right-hand fly-out which should have appeared. Select 'AP' from the drop-down menu.

3) Tick the second & third box beside 'SignalEP'.

4) In the left-hand rolling stock fly-out, click the 'Track Infrastructure' category and select 'AP SEP Approach Control'.

5) Place this marker in the vicinity of the junction signal you are wishing to apply/customise approach control. Place its link (the light blue arrow with orange tip) in front of the signal with the arrow facing towards the signal. If the arrow is facing the wrong way, press **Shift** whilst clicking the arrow to change its direction.

6) Double click the red box which says 'AP Approach Control' on it and go to the right-hand fly-out menu.
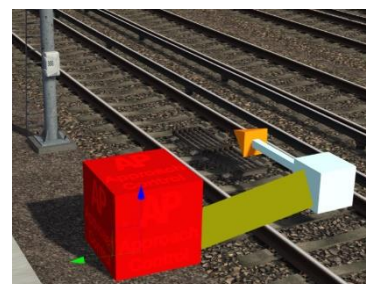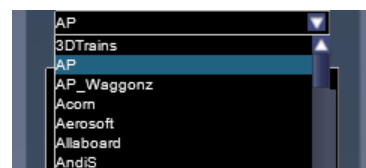
You have now successfully placed the track marker. Now it is time to customise it to your needs.

Release from Red

Input **R** into the first 'Identity' box.

Release from Red/Yellow

Input **RY** into the first 'Identity' box.

Release from Yellow
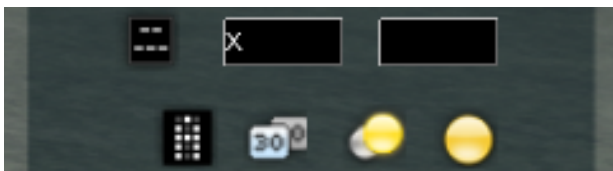
Input **Y** into the first 'Identity' box.

Flashing Yellows

Input **F** into the first 'Identity' box.

Remove Approach Control

Input **X** into the first 'Identity' box.

Release Distance

The distance from the junction signal at which it 'steps up' to a double yellow or green aspect (clear blocks ahead permitting) can also be amended. To do this, input **;D=x** in the second 'Identity' box. **x** is the value of your desired release distance in metres.

In addition, to amend the distance at which a junction signal changes to yellow when using 'Release from Red/Yellow', input **;D2=x** in the second 'Identity' box. **x** is the value of your desired release distance in metres. Note that this value should always be greater than the value at which the signal will release to double yellow/green.

Limitations

This marker will apply to all possible routes on a signal and will overwrite what is stipulated on the signal in the route editor.

You cannot have different types of approach control or release distances for different routes. Seeing as though your player train will be taking a pre-defined route as set out in the scenario, this shouldn't be an issue.

Recommendations

If you are wondering whether a junction signal should have approach control, and if so, what type and release distance, please see below for advice.

Approach Control - Yes/No?

If a diverging route has a speed limit differential of 10mph or more, approach control must be provided. If the differential is 10mph or less, approach control tends to not be required.

Type

This is mostly covered in the description of each type as found earlier in this manual but to summarise, the type of approach control utilised is usually dictated by the speed of the diverging route and also the speed differential between the main route and diverging route. Please see below for a summary of each type:

Release from Red - Junctions with a speed of 30mph or less

Release from Red/Yellow - Junctions with a speed of 40-50mph

Release from Yellow - Usually only found in 4 aspect signalled areas. Junctions where the speed differential is suitably low (20mph or less) for a double yellow before the junction signal to adequately warn the driver to slow their train in time for the junction at the next signal.

Flashing yellows - Junctions with a speed of 50mph+

This advice is by no means set in stone but should serve as a good guide in the absence of real-world knowledge.

Release Distance

Railway standards dictate that a junction signal with approach control can not 'step up' to a clear aspect (not red) until both the main aspect and route indicator are visible by the driver. Main aspects and feathers are considered to be visible at 800m so regardless, the release distance should never be more than 800m. If the route indicator is a theatre box, this reduces to 250m. If the route indicator is a miniature theatre box as often found on shunt/ground signals, this reduces to 100m.

If the main aspect and route indicator are not visible at these distances due to the curvature of the line or a structure, then the signal must not release until they are visible.

To work out a suitably realistic distance then, you must measure the distance from the junction signal to the point at which the driver will see it. If this is over 800m then the release distance is 800m. If it is under, use this figure as your release distance.

Beyond visibility of the junction signal, the speed differential of the junction is also a factor. For example, when taking a 20mph junction on a 100mph line, the junction signal may well stay at red until you are much closer than 800m, even if the junction signal is visible from 800m. This is to ensure the speed of the train is sufficiently reduced.

These are the main two factors but it's fair to say that every signalling installation is unique and has its own factors at play. Like when deciding the type then, if you have real-world data to hand, use it, but if not, the above should be a good enough guide.

Important Note

If sharing a route which has custom approach control information inputted into a signal's 'Identity' box, the signal will still work okay for those who do not have the Signal Enhancement Pack installed. The type of approach control will simply revert to default. The only issue will be that the data plate on the signal post will not display properly.

If sharing a scenario which makes use of the 'Approach Control' track marker, the end-user must own the Signal Enhancement Pack for the correct behaviour to be exhibited. If they do not own the Signal Enhancement Pack, signals immediately around where the track marker is placed may act unpredictably.

Track Markers

A selection of custom track markers are provided in this pack which can be placed in routes or scenarios to tailor the behaviour of signalling even further.

Force Signal

Four track markers; ***Force Red***, ***Force Yellow***, ***Force Double Yellow*** & ***Force Green***, are provided to allow the route or scenario creator to force the signal ahead of where the marker is placed to show a certain aspect. Their default behaviour is to force the aspect until a train passes over the marker. The signal will then revert to its normal state until it is passed by the train and turns to danger. The marker will then activate again and force the requested aspect for the next train, if there is one.

Calling On

If the signal ahead has an associated position light, aka calling on signal, it will illuminate as soon as the train passes over this marker. This saves the player having to press 'Tab' if they wish for the calling on signal to illuminate.

In addition, if the signal in question does not have a calling on signal, it will display a yellow aspect instead to tell the driver they can proceed.

Please note that this marker will show the calling on signal/yellow aspect regardless of whether pressing 'Tab' would do so. As the scenario creator then, you need to be sure the path is clear when this marker is activated.

The functionality stated above is suitable for a signal already showing a red aspect, but what if it is showing a proceed main aspect (yellow, double yellow or green) and you know the signal should be showing a red aspect and associated position light

instead? To implement this behaviour, see the 'Associated Position Light' section of this manual.

Invisible Signal

The invisible signal marker allows a signal block to be divide. An example of using this is on a platform where you wish for two trains with driver icons to be present. Ordinarily, doing this would produce an error in the scenario editor, but if you place this marker between the two trains, the simulator now thinks there is a signal dividing them and allows it. Stopping points are useful for stopping trains in exact positions for this purpose.

Invisible signals are visible on the F3/F4 HUD but can be ignored. Apart from that, they are invisible to all other signals around them and do not affect their operation.

How to Place a Track Marker

1) In the left-hand rolling stock fly-out, click the object set filter which looks like a blue box with an orange arrow to the right of it.

2) Go to the right-hand fly-out which should have appeared. Select 'AP' from the drop-down menu.
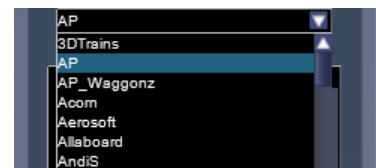
3) Tick the second & third box beside 'SignalEP'.

4) In the left-hand rolling stock fly-out, click the 'Track Infrastructure' category and select your desired track marker.

5) Place this marker in the vicinity of the junction signal you are wishing to apply/customise approach control. Place its link (the light blue arrow with orange tip) in front of the signal with the arrow facing towards the signal. If the arrow is facing the wrong way, press **Shift** whilst clicking the arrow to change its direction.
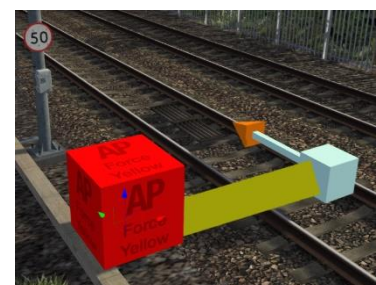
6) If you wish to customise the operation of the marker as described in the next section, double click the box which says the name of the marker on it and go to the right-hand fly-out menu. The 'Invisible Signal' marker cannot be customised.

Variables

Delay

A delay in seconds can be added so the marker does not carry out its final function until the delay has passed. For example, if selecting a 10 second delay on the 'Force Red' marker, the signal being forced to red will not revert to its normal state until 10 seconds after the train has passed the marker. Similarly, if selecting the same delay on the 'Calling On' marker, it will not show the calling on signal until 10 seconds after the train has passed the marker.

To do this, add **;D=x** into either of the two 'Identity' boxes. **x** is the value of the delay in seconds.

When using a 'Force Signal' marker, if you would like the delay to be infinite and for the signal never to revert to its normal state, make the **x** value **999**. This has many uses but one in particular is for the simulation of a track circuit failure, which would require the driver to pass the signal in advance of the failure at danger.
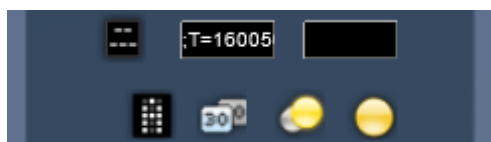
Time

A time can be inputted so the marker does not carry out its final function until the time has been reached in a scenario.

To do this, add **;T=hhmmss** into either of the two 'Identity' boxes. **hhmmss** is the time in hours/minutes/seconds without any punctuation.

For example, input **;T=160050** on the 'Force Red' marker and the signal being forced to red will not clear until 16:00:50. Similarly, if inputting the same time on the 'Calling On' marker, it will not show the calling on signal until 16:00:50.

This is particularly useful when wanting to keep platform starter signals at red until shortly before departure time.

Random

A random factor can be stipulated for even more variety. For example, if selecting a random factor of 10 seconds, the moment the marker carries out its final function will be plus or minus 10 seconds the value stipulated for 'Delay' or 'Time'. For example, if you are using 'Time' and have told the marker to carry out its final function at 16:00:50, a random factor of '10' means it will happen at some point between 16:00:40 and 16:01:00.

To do this, add **;R=x** into either of the two 'Identity' boxes. **x** is the value of the random factor in seconds.

Probability

*This variable **cannot** be used on the 'Calling On' track marker.*

A probability factor can be stipulated so a 'Force Signal' marker does not always force the signal it is acting upon to show the relevant aspect. For example, if selecting a probability factor of 50% on the 'Force Red' marker, the signal ahead will not be forced to show a red aspect 50% of the time. If selecting a probability factor of 25%, the marker will only force the signal ahead to show a red aspect 25% (1 in 4) of the time.

To do this, add **;P=x** into either of the two 'Identity' boxes. **x** is the percentage value of the probability factor. Do **not** include the **%** character, **x** is a numerical value only.

This is useful if you want the signals that a player faces during a scenario to vary every time they drive it. Alternatively, when building a route, if a signal is notorious for not clearing sometimes for whatever reason (a level crossing not closing in good time for example), then you can randomise when the player sees an adverse signal to represent this.

Time Start

*This variable **cannot** be used on the 'Calling On' track marker.*

A time can be inputted so a 'Force Signal' marker does not force the signal it is acting upon to show the relevant aspect until the time has been reached in a scenario.

To do this, add **;TS=hhmmss** into either of the two 'Identity' boxes. **hhmmss** is the time in hours/minutes/seconds without any punctuation.

For example, input **;TS=160050** on the 'Force Green' marker and the signal being forced to show green will not do so until 16:00:50.
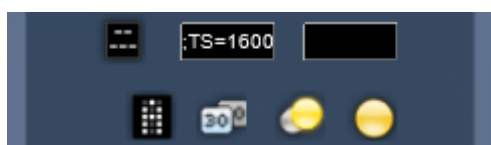
This is the only way you can force a signal to display a less restrictive aspect and is intended for scenario creators to overcome the issue of 'false reds' where a signal should be showing a proceed aspect but isn't, usually due to the incorrect placement of the signal by the route builder.

Alternatively, scenario creators may just wish to use the 'Calling On' marker to overcome 'false reds', but the display of a calling on signal or yellow aspect may not always be what the signal should show. In that case, consider using a 'Force Signal' marker and this 'Time Start' variable for extra realism.

Important Notes

'Delay', 'Time' and 'Time Start' variables cannot be used in combination with each other. You can only use one of these three variables per marker.

The 'Time Start' variable cannot be used in combination with the 'Probability' variable.

If you are wishing to use a track marker at the start of a scenario that acts upon the signal in front of the player, please place it 10m or less from the front of the player train. This will ensure it activates and is primarily useful for keeping a signal at red until shortly before departure. Please note that if the leading locomotive of the player consist is reversed with the driver icon facing the opposite direction of travel, you will need to place the track marker beneath the rear vehicle of the consist, less than 10m from the rear of the consist.

If you have already placed a track marker and wish to edit its 'Identity' information to use/edit variables, make sure you move the light blue arrow with an orange tip so the changes are saved. Just changing the information will sometimes not save.

If sharing a scenario or route which makes use of a track marker, the end-user must own the Signal Enhancement Pack for the correct behaviour to be exhibited. If they do not the own Signal Enhancement Pack, signals immediately around where the track marker is placed may act unpredictably.
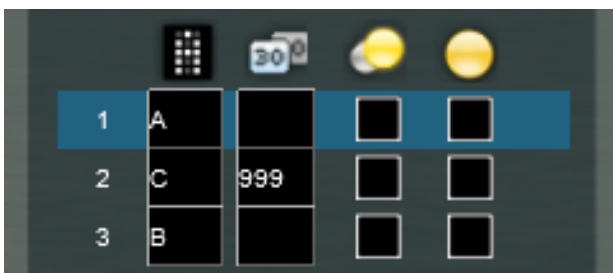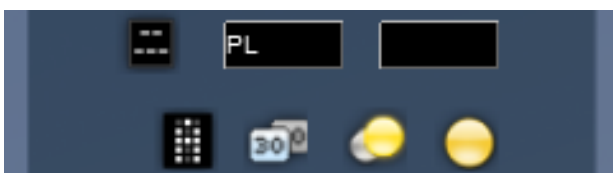
Associated Position Light

For signals with an associated position light, aka calling on signal, this can now be used to provide authority to proceed instead of a yellow, double yellow or green.

Note that the associated position light will only illuminate if the section ahead does not contain any trains with driver icons.

To do this in the route editor, double click the signal and go to the right-hand fly-out menu. Input **999** into the 'Speed Limit' box of the link/links that you would like to use the associated position light.

To force this behaviour on a signal in a scenario, use the 'Calling On' track marker and input **PL** into the first 'Identity' box.

For any signal with this functionality applied, the associated position light will not illuminate until a train is 100m or less from it.

Bits and Bobs

This section is dedicated to aspects of this pack that don't warrant a dedicated section but are still of note:

- Flashing yellows are now illuminated for 0.7 seconds (opposed to the default 0.5 seconds) of every 1 second as per reality.

- Incandescent flashing yellows never turn off. They simply go from bright to dim to bright. This was found by British Rail to increase the lifetime of the bulb.

- Signals are now more visible from a distance

- Debugging messages have been switched off in case this increases performance, especially on AI intensive routes.

- Features listed in this pack can only be used on colour light signals. Any semaphore signals that happen to be packaged with routes supported by this pack are not compatible.

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