An Un-Official Guide to Signalling in Rail Simulator

By Mark Brinton

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Changes since last version are shown in blue.

Introduction

The intention of this guide is to show how the "as supplied" signalling can be applied for custom routes in an operationally as realistic a manner as possible. It is not intended to deal with any programming or scripting issues as they are being described elsewhere by others more competent than myself in these aspects. This is a "work in progress" and will be developed as more is discovered about the new Rail Simulator (RS) signalling system. This document is designed to act as a basic description of the system until such times as more comprehensive documentation becomes available from Rail Simulator. This is in no way an official publication and has not been sanctioned or approved in any way by Rail Simulator.

The following directions are referenced:
Normal – When the train is proceeding in the direction to which a signal applies.
Reverse – When the train is moving in the opposite direction to which a signal applies.

It may be that in scenarios the semaphore signalling behaves slightly different from when in Free Roaming mode. The testing to determine the following conclusions was undertaken in Free Roam so as to demonstrate the different effects. However in Free Roam the normal position for the signals is off (clear) unlike the real thing.

UK Semaphore Signals

For the sake of simplicity I have shortened the signal file names in the descriptions below. The file descriptions in the options panel on RS in Editor Mode all start with "B Lattice… or B Wooden… ". Below I have only used the unique part of the file name omitting the initial part. A full list of the supplied UK signals is shown in an Appendix A.

Signal Links or Markers

Each signal has one or more markers (referred to as track links in RS Manual). There would appear to be at least four types of markers which for the purposes of this document I have called "Initial", "Route", "Reset" and "Sequential".

"Initial Marker"

Each signal has one of these markers (See Fig.1). In free roam mode this appears to perform the following functions at stop signals:-
When moving in the normal direction:
1) As front of train passes it sets the signal to on.
2) As the rear of the train passes it sets the preceding signal to off.
When moving in the reverse direction:
3) As the front of the train passes it sets the next signal in the direction of travel to on.

4) As the rear of the train passes it sets its own signal to off.

"Route Marker"
A signal may have one or more of these type of markers (See Fig.2), see Appendix A. It would appear to be used by the signal to determine if a relevant route is set. The signal seems look at the lay of the points between the "Initial Marker" and the "Route Marker". It would also appear to look for conflicting set routes crossing the path. It does not detect reverse routes if the lay of the points is the same. The signal would also appear to look to the next signal beyond the "Route Marker" for its authority to display a clear indication. Except where the marker is of the "Reset" type.
Only the first six "Route Markers" display their number. Seven onwards do not display their numbers above them.
The number of "Route Markers" that a signal has is the figure suffixed with a "T" or "t" in its description.
For multi-arm signals one or more "Route Markers" will apply to each arm. See Appendix A for details.

"Reset Marker"
This is a "Route Marker" but has the additional two functions:
1) When the train is moving in the normal direction, as the rear of the train passes over it the signal is re-set to clear.
2) When the train is moving in a reverse direction and the front passes over it the signal is set to on.
These "Reset Markers" are visually indistinguishable from "Route Markers". Their presence and number is indicated in the signal description. The number of them is the figure suffixed with an "E". They also form part of the total number in the "T". See Appendix A to determine which markers are which type for a specific signal.
The exact meaning of the suffix 1 on some E numbers has yet to be determined.

"Sequential Marker"
These are only fitted to signals with "Special" in their description. The markers have to be detected by the signal in a specific order for them to clear (e.g. 1 - 2 -3). Refer to the signal specific instructions below of examples of their use.

The Basic Semaphore Stop Signal

This signal consists of one stop (red arm) on a post. In RS this comes in a number of versions. For now the two we are going to discuss are "sig_h" and "sig_h 1T".
Signal "sig_h" is a basic stop signal and can be used where ever there is no point work that requires to lock the signal (e.g. advanced starting signal). This signal should have the post positioned as described in the RS instruction manual. Having left clicked to position the post you will be presented with a marker (or link) (Fig.1) at the cursor. This should be positioned in the "four foot" of the required track in advance of the signal. I would suggest that if possible this is a least a scale 25m. The reason for this is that when the front of the train passes this marker the signal will go to danger.

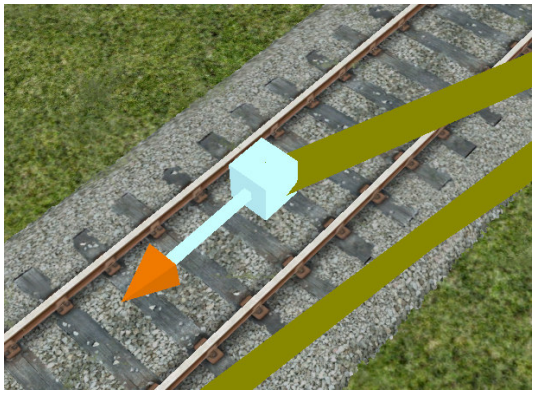

Figure 1 Initial Marker

Once the marker is roughly positioned, right click to stop the repeat copy, then left click on the post and correctly orientate and position the signal and post. When initially set the marker may point in the wrong direction as it seems to take its orientation from the signal. So whilst the signal is highlighted and the marker visible, check and re-position it, if necessary, so that the marker arrow point in the normal direction. To reverse the direction of the arrow, just move the marker slightly by highlighting (turns yellow) and then grabbing with the mouse. If necessary the arrow will then reverse.

Signal "sig_h 1T" is similar to the previous one but can be used where there is one route in advance of the signal that has some point work which requires route detection (e.g a passing loop starting signal. This signal is installed similarly to the previous one, but once the first marker has been positioned you will be presented with a further one ("Route Marker") which looks similar, but has a figure one (1) above it (see Fig.2). Position this marker on the far side of the point work that requires to be monitored by the signal. See Fig.3.

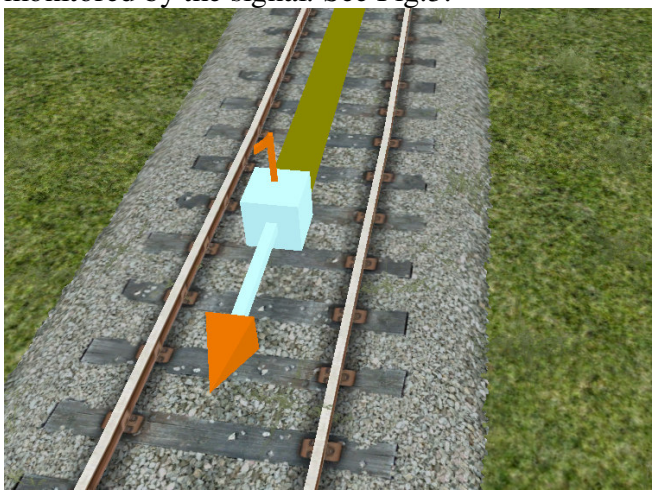

Figure 2 Route, Reset or Sequential Marker No.1

(The reference in the previous version of this document to putting the "Route Marker" in advance of the next signal has been removed as further testing has proved this un-necessary, except for specific purposes described elsewhere).

Route markers above number six do not display numbers.

Other basic single arm stop signals are set up similarly. The order of the routes (Left to Right) is not important. If the signal has any “Reset Markers” they will normally be the highest numbered ones.

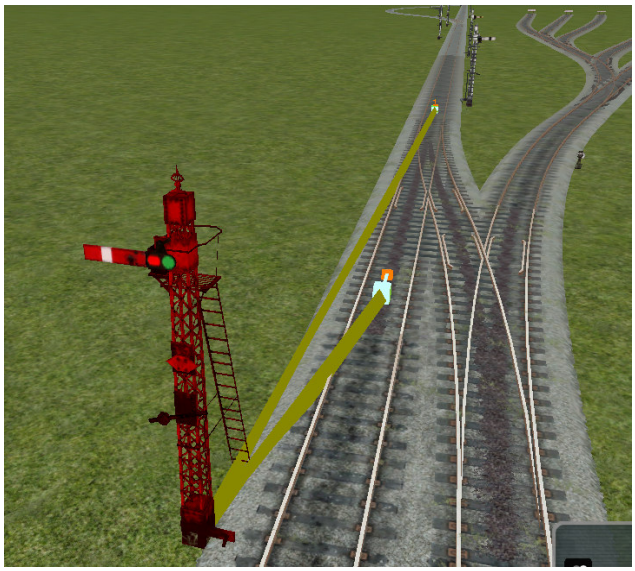

Figure 3 Typical set-up for signal "sig_h 1T"

The Basic Junction Stop Signal

This comes in a number of forms but the basic one we are considering here is “juncsig l2_hh”. This is a bracket signal with two equal height stop arms.
Position the signal as described above to the rear of the junction points. Place the first (Initial) marker in advance of the signal, but before the points. Then place the next (Route) marker (1) along the left-hand (primary) route so that it is ahead of the all the point work required to be monitored by the left hand arm of the signal. Having placed this marker you will then have a third (Route) marker (2) which should be placed along the right-hand (secondary) route again ahead of all the point work to be detected. See Fig.4.
The initial marker and the route markers 1 and 2 affect their respective arms as described above, however they share the initial marker.
Note that the left to right order of setting out the “Route Markers” does not apply to all multi-arm signals. Some signals set out their markers set-out right to left. Refer to Appendix A for details of a specific signal.

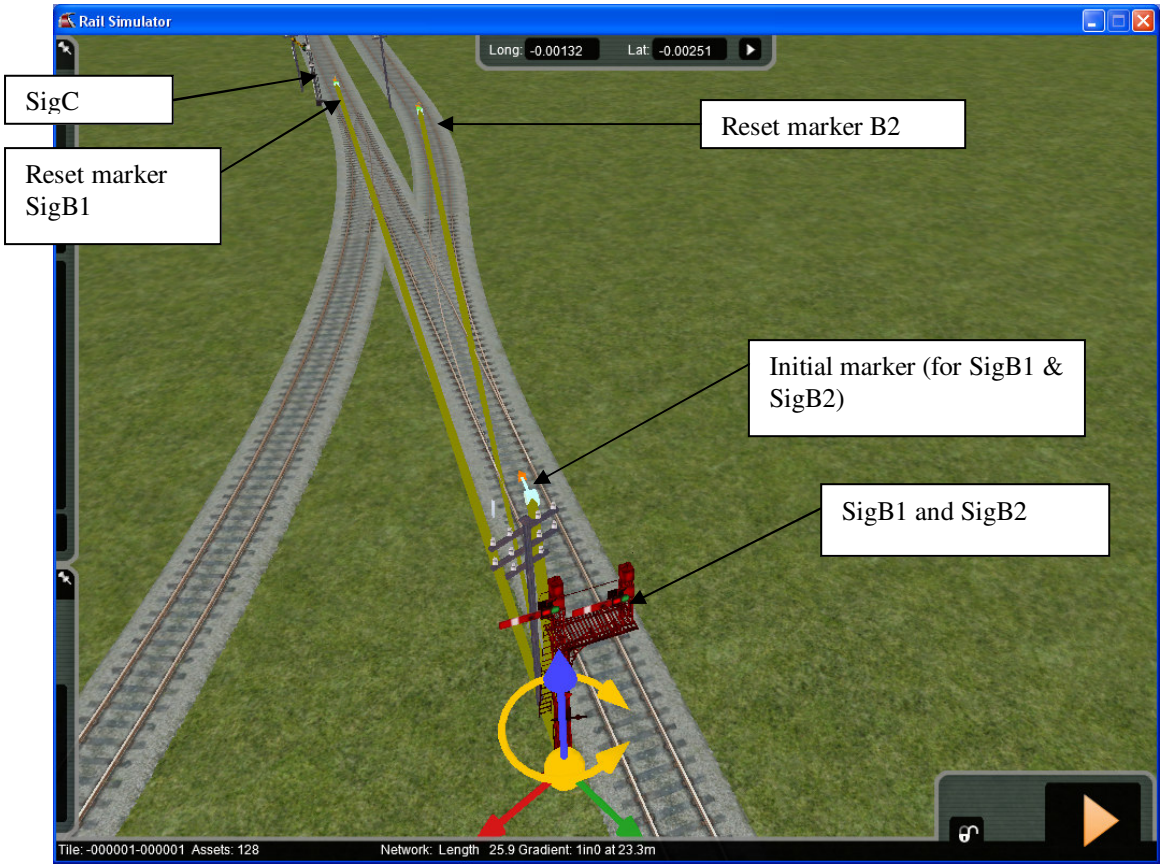

Figure 4 Set-up for "juncsig l2-hh"

The Distant Signal

This signal should be positioned as required to the rear of the home signal it is protecting. It only has an "Initial Marker" and this should be placed adjacent to the signal pointing in the normal direction. See Fig.5.

(The reference in the previous version of this document to placing its initial marker in advance of the home signal can be ignored as subsequent testing has proved this unnecessary.)

The distant signal will only repeat the indication of the next signal. Therefore, it can't currently be used for correct indications of Home and Starting signals. Tests moving the initial marker well beyond the "home" signal, kept the distant off all the time.

I have not yet been able to make the splitting distant signals function and they remain on under all test scenarios at present.

Note, the distant signal has a "Rule 55 Exempt" Plate which is not correct for the real world.

Distant signals do not show on the 2D Map.

Combined Stop and Distant Signal

There are two basic types of this signal, "combsig_hd" and "combsig_hd 1T". These are set up in a similar manner to their stop signal equivalents. There are no specific markers for the distant arm.

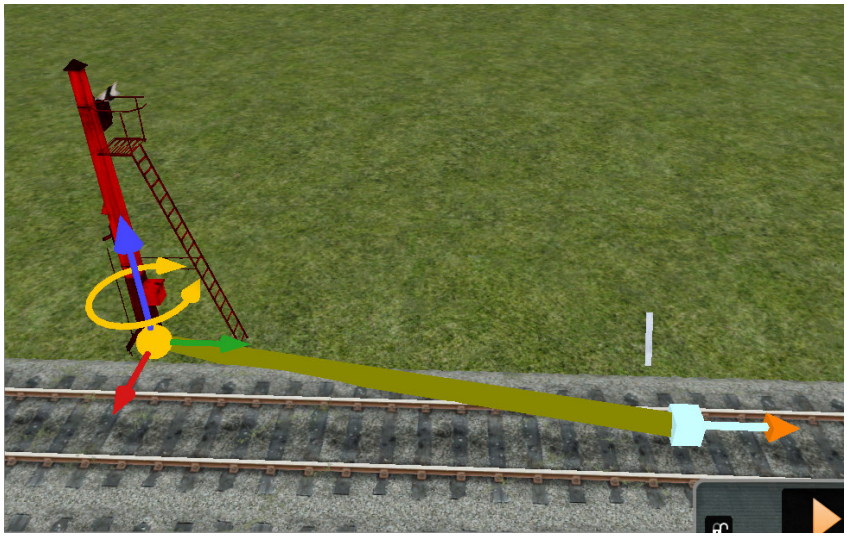

Figure 5 Typical set-up for a distant signal

Signals with "Reset Markers"

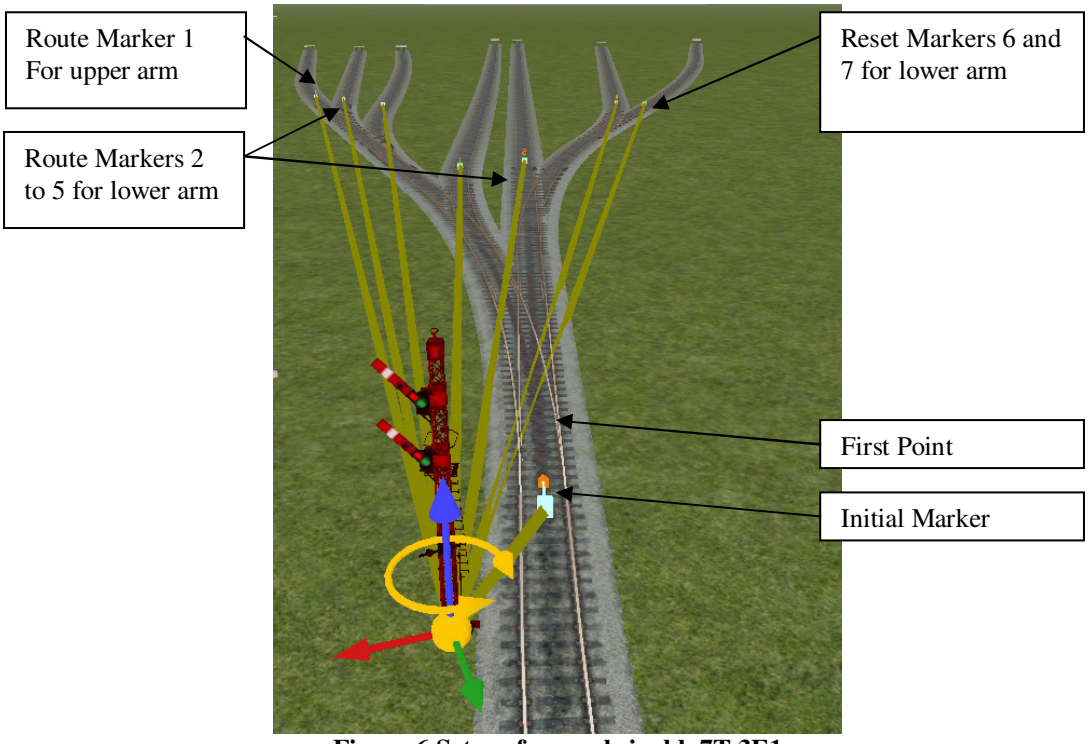

Figure 6 Set-up for combsig_hh 7T 3E1

Signals with "Reset Markers" are set up similarly to junction signals, however one or more "Reset Markers" have the additional capability to return their signal to clear without reference to any other signals. It is believed that these routes should be used where trains will pass out of a "signal controlled" area e.g. a yard or group of sidings. See Appendix A for a list of signals with this facility and the marker numbers to which it applies.
Note the signal illustrated above has a code 3E1 which has yet to be fully understood. For the purposes of these trials, tests have revealed that it only has two "Reset Markers".

Signals with “Sequential Markers”

These signals have the word “special” in their description. The single arm signals have two or more markers. The Junction signal has three markers one common to both arms then and additional marker for each arm.

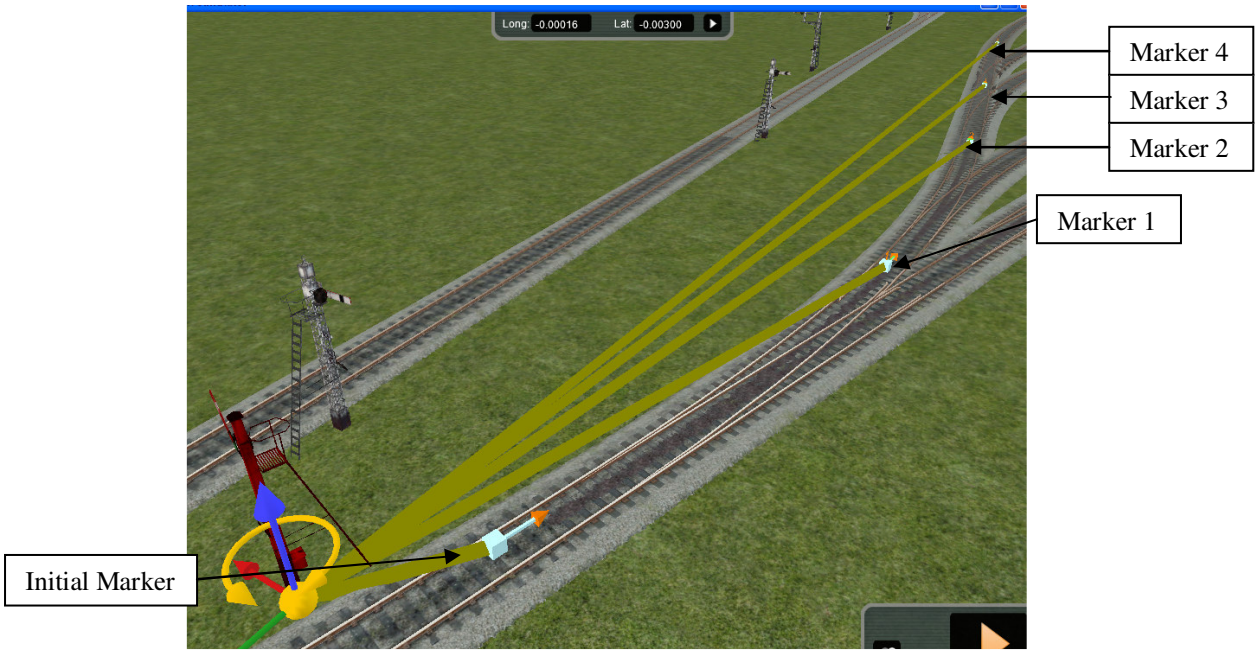

Figure 7 Typical set-up for a single arm signal with "Sequential Markers"

In the example shown in Fig.7 the route needs to be set from the Initial Marker through Markers 1, 2, 3 and 4 before the signal will clear.

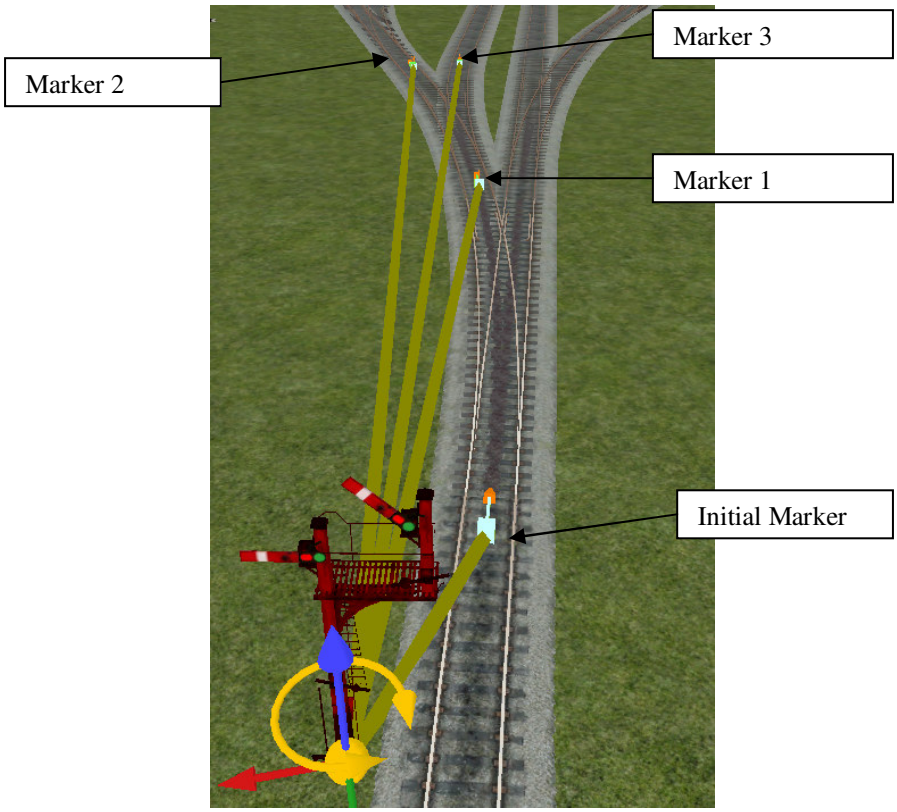

Figure 8 Typical set-up for a junction signal with "Sequential Markers"

In the example shown in Fig.8 for the LH arm to clear the route needs to be set from the “Initial Marker”, through Marker 1 and Marker 2. For the RH arm the route needs to be “Initial Marker”, Marker 1, then Marker 3.

Signal “Juncsig X_h”

This is another special signal.

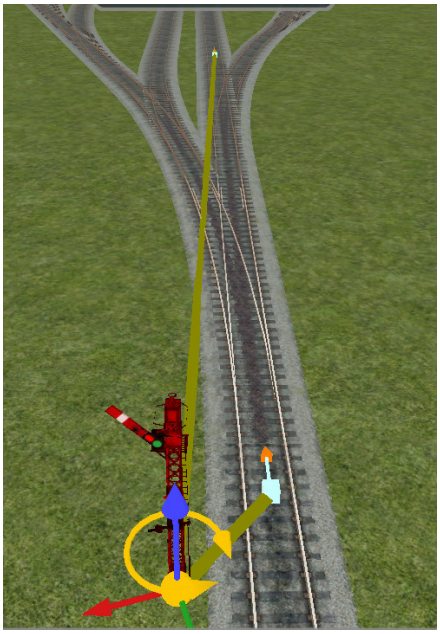

Figure 9 Typical set-up for Juncsig X_h

This signal has only one route from the “Initial Marker” to the “Route Marker” if any of the points between the markers are set to another route then the signal is on.

AWS Ramps

These no not appear currently to work correctly with semaphore signals. This was tested using a suitable locomotive in expert driver mode, an AWS Ramp to the rear of a semaphore distant signal (or any other semaphore signal tested) a bell regardless of the signal position (ramps are not normally fitted to semaphore stop signals, unless fitted with a distant arm). It is also confirmed that the ramps do not work correctly with the home & distant combined signals either.

Testing of AWS Ramps with colour light signals suggests that they work correctly providing that your loco is fitted with AWS and that you are driving in expert mode. AWS Inductors (to use their correct name) should be positioned about a scale equivalent of 220yds (200m) to the rear (before) the signal. The inductor should be positioned with the shallow angled ramp facing oncoming trains. The marker should be positioned very slightly in advance of the centre of the ramp with the arrow pointing in the direction of travel which the AWS is required to operate with. See Fig.7. When the marker is passed over is when the horn/bell sounds in the loco cab. The loco equipment appears to work correctly as would be required on the real thing. Once the horn starts to sound the AWS indicator goes black. If the reset button (Q key) in not pressed within a couple of seconds then the brakes are applied. When the reset button (Q key) is pressed the AWS Indicator goes to black and yellow and the brake application cancelled. If the signal is showing a clear (green) aspect then the AWS Indicator goes black and the bell rings (or equivalent tone sounds).

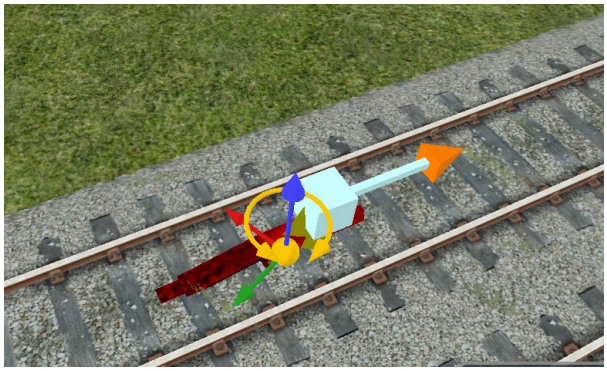

Figure 10 AWS Inductor

TPWS Track Aerials (Grids)

These do not work with semaphore signals. For them to work you need a suitable equipped locomotive (the only one I have found so far is the HST). The Grid needs to be set in the four foot just in advance of the stop signal. Its marker should be set adjacent to and in advance of the ramp with the arrow pointing in the direction of travel see Fig.8 for details. The highlighted (dark yellow) half of the Grid should be rotated so that it is the second half to be passed over. The model supplied is a “Train Stop Sensor (TSS)”.
Not all signals are fitted with TPWS equipment. In general they are only fitted where if the signal is passed at danger a route conflict (side or head-on collision) may occur.

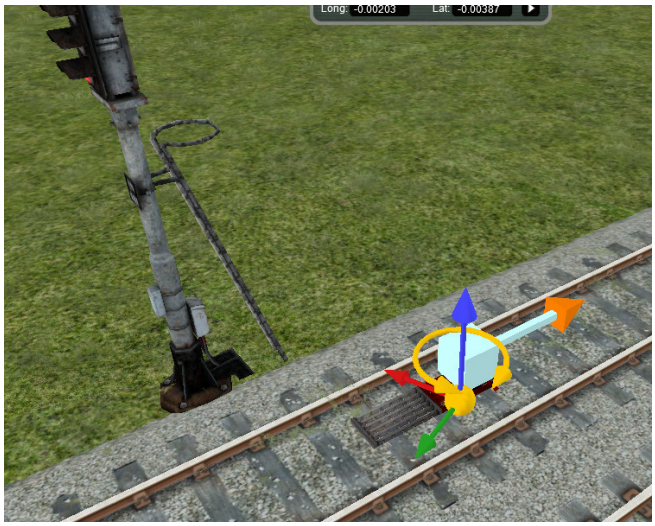

Figure 11 TPWS "Grid" Installation

The “on-train” equipment does not operate (TPWS Control Panel) is shown but does not appear to be interactive, also the brake demand indicator does not illuminate when the brakes are applied by the TPWS. There is no facility for temporary isolation or train stop over-ride.
There is no over speed sensor (OSS) track equipment for TPWS.

For those who are interested the GW ATP equipment on the HST power car does not indicate. It would appear that an over-speed situation with this stock initiates an emergency brake application until the train is brought to a stand. This is not correct of this system.

It is intended to undertake more testing with TPWS and ATP when the main testing of colour light signals is done. Perhaps by then, someone will have devised working cab controls for these aspects. It makes little sense to have alleged "working" track equipment if the cab controls for the systems do not function.

UK Colour Light Signals

This area of work will be developed once more is known about the semaphore signals. The colour light equivalents will hopefully work in much the same way as their semaphore counter-parts.

Testing Currently Under Way

As mentioned above this document is currently a work in progress as much needs to be discovered about the Rail Simulator signalling system in the absence of any significant detailed official information. Other individuals appear to be focussing their efforts into gaining an understanding of the control scripts for the signalling and also the graphical "models". I propose to continue with documenting of the application of the "as supplied" signals so as to enable other Railway Simulator route builders to gain the maximum possible realism from these signals and to advance the general understanding of the signalling system where possible. To these ends I have listed below the next areas where my attention will be focussed.

3) Establishing the differences between the various basic signals and their applications to route setting.
4) Testing of ground signals especially to establish the significance of the "mainline" in description.
5) Testing of the interfaces between colour light and semaphore signalling.
6) Establish the different effects of facing and trailing points on "Route Markers" and to document the effect of trailing points on "Sequential Markers".
7) Investigate if Special Signals can be used to control a single line section in a realistic manner.
8) Investigate issues with the splitting distant signals.

Appendix A - Signals Supplied with Rail Simulator

Lattice Post Semaphore Signals

Files names: b_lattice [model name].bin for signals with lattice posts and b_wooden [model name].bin for signals with wooden posts.

Description	Model Name	Lattice Post	Wooden Post	Arm	Route Markers	Reset Markers	Sequence Markers	Remarks
Distant signal	sig_d	yes	yes	single	no	no	no	
Stop signal	sig_h	yes	yes	single	no	no	no	see notes
	sig_h 1T	yes	yes	single	1	no	no	
	sig_h 2T	yes	no	single	2	no	no	not yet fully tested
	sig_h 2T 1E	no	yes	single	1	2	no	not yet fully tested
	sig_h 3T	yes	no	single	1-2-3	no	no	not yet fully tested
	sig_h 3T 1E	yes	no	single	1-2	3	no	not yet fully tested
	sig_h 3T 2E	yes	no	single	1	2-3	no	not yet fully tested
	sig_h 4T	yes	no	single	1-2-3-4	no	no	not yet fully tested
	sig_h 5T 1E	yes	no	single	1-2-3-4	5	no	
	sig_h 6T 2E	yes	no	single	1-2-3-4	5-6	no	
	sig_h 7T	yes	no	single	1-2-3-4-5-6-7	no	no	
	sig_h 8T	yes	no	single	1-2-3-4-5-6-7-8	no	no	
	sig_h special 1	no	yes	single	no	no	1+2	
	sig_h special 2	no	yes	single	no	no	1+2+3	
	sig_h special 3	no	yes	single	no	no	1+2+3+4	see notes
Stop + Distant signal	combsig_hd	yes	yes	Double	no	no	no	not yet fully tested
	combsig_hd 1T	yes	yes	Double	1	no	no	see notes
	combsig_hd 2T	yes	no	Double	1-2	no	no	
Stop + Stop	combsig_hh	yes	yes	upper	1	no	no	

Description	Model Name	Lattice Post	Wooden Post	Arm	Route Markers	Reset Markers	Sequence Markers	Remarks
signal				lower	2	no	no	
	combsig_hh 7T 3E1	yes	no	upper	1	no	no	see notes
				lower	2-3-4-5	6-7	no	see notes
	combsig_hh 2T 2E	no	yes	upper	no	1	no	
				lower	no	2	no	
Branch stop, Main stop on RH Bracket	junc L1 hh	yes	yes	left	2	no	no	
				right	1	no	no	
Branch stop, Main stop on RH Bracket	junc L1 hh special 1	no	yes	left	no	no	1+3	see notes
				right	no	no	1+2	see notes
Branch stop, Main stop on RH Bracket	junc L1_hh 2T 1E	no	yes	left	no	2	no	not yet fully tested
				right	1	no	no	not yet fully tested
Main distant, Branch distant on RH bracket	junc L2 dd	yes	yes	left	no	no	no	Currently does not appear to detect any signals in advance and remains permanently on.
				right	no	no	no	Currently does not appear to detect any signals in advance and remains permanently on.
Main stop, Branch stop on RH bracket	junc L2 hh	yes	yes	left				not yet tested
				right				
Main stop, Branch stop on	junc R1 hh	yes	yes	left	1	no	no	
				right	2	no	no	

Description	Model Name	Lattice Post	Wooden Post	Arm	Route Markers	Reset Markers	Sequence Markers	Remarks
LH bracket								
Main stop, Branch stop on LH bracket	junc R1 hh 2T 1E	yes	no	left	1	no	no	
				right	no	2	no	
Main stop, Branch stop on LH bracket	junc R1 hh 7T	yes	no	left				not yet tested
				right				
Branch distant, Main distant on LH Bracket	junc R2 dd	yes	yes	left	no	no	no	Currently does not appear to detect any signals in advance and remains permanently on.
				right	no	no	no	Currently does not appear to detect any signals in advance and remains permanently on.
Branch stop, Main distant on LH Bracket	junc R2 hd	yes	yes	left home				no realistic application, not yet tested
				right distant				no realistic application, not yet tested
Main stop, Main distant on T bracket	junc T hd	yes	yes	left home				no realistic application, not yet tested
				right home				no realistic application, not yet tested
Main stop, Main stop on T bracket	junc T hh	yes	yes	left	1	no	no	
				right	2	no	no	
Single arm	junc X h	yes	yes	single	special	no	no	Signal will only clear for

Description	Model Name	Lattice Post	Wooden Post	Arm	Route Markers	Reset Markers	Sequence Markers	Remarks
stop								specific route. See notes.

Shunting Signals

Files names for disc signals: b_Shunt Signal [model name].bin

Description	Model Name	Lattice Post	Wooden Post	Arm	Route Markers	Reset Markers	Sequence Markers	Remarks
Shunt disc signal	shunt_signal_entry	NA	NA	single	1-2	no	no	testing incomplete
	shunt_signal_entry_mainline	NA	NA	single	1-2	no	no	testing incomplete
	shunt_signal_exit	NA	NA	single	1	no	no	testing incomplete
	shunt_signal_exit_mainline	NA	NA	single	1	no	no	testing incomplete
wooden	shunt_entry	no	yes					does not work and defective graphic
	shunt_ exit	no	yes					does not work and defective graphic

Appendix B – List of Signal Control Files

The lua files are normally referred to as the signal script files and control how the individual arms operate.
The bin files are the xml files converted for Rail Simulator and contain the signal location specific information (e.g. number and type of arms, position etc.).
The pcdx files would appear to be some sort of graphic file specifically for Rail Simulator.
The ban files would appear to be the animation control files.
Below is a list of principle signalling files and where they can be found with the default Rail Simulator set-up

C:\Program Files\Rail Simulator\Assets\Kuju\RailSimulator\RailNetwork\signals\UK Semaphore
Sem_Comb_hd.lua
Sem_DistantSig.lua
Sem_DvgeRte_dd.lua
Sem_DvgeRte_hh 1E.lua
Sem_DvgeRte_hh 2E.lua
Sem_DvgeRte_hh 3E1.lua
Sem_DvgeRte_hh Special 1.lua
Sem_DvgeRte_hh.lua
Sem_HomeSig 1E.lua
Sem_HomeSig 2E.lua
Sem_HomeSig Special 1.lua
Sem_HomeSig Special 2.lua
Sem_HomeSig Special 3.lua
Sem_HomeSig.lua
Sem_Shunt_Entry.lua
Sem_Shunt_Entry_Mainline.lua
Sem_Shunt_Exit.lua
Sem_Shunt_Exit_Mainline.lua

C:\Program Files\Rail Simulator\Assets\Kuju\RailSimulator\RailNetwork\signals\UK Semaphore\Lattice_Posts
B Lattice CombSig_hd 1T.bin
B Lattice CombSig_hd 2T.bin
B Lattice CombSig_hd.bin
B Lattice CombSig_hh 7T 3E1.bin
B Lattice CombSig_hh.bin
B Lattice JuncSig L1_hh.bin
B Lattice JuncSig L2_dd.bin
B Lattice JuncSig L2_hh.bin
B Lattice JuncSig R1_hh 2T 1E.bin
B Lattice JuncSig R1_hh 7T.bin
B Lattice JuncSig R1_hh.bin
B Lattice JuncSig R2_dd.bin
B Lattice JuncSig R2_hd.bin
B LAttice JuncSig T_hd.bin
B Lattice JuncSig T_hh.bin
B Lattice JuncSig X_h.bin
B Lattice Sig_d.bin
B Lattice Sig_h 1T.bin
B Lattice Sig_h 2T.bin
B Lattice Sig_h 3T 1E.bin
B Lattice Sig_h 3T 2E.bin
B Lattice Sig_h 3T.bin
B Lattice Sig_h 4T.bin

B Lattice Sig_h 5T 1E.bin
B Lattice Sig_h 6T 2E.bin
B Lattice Sig_h 7T.bin
B Lattice Sig_h 8T.bin
B Lattice Sig_h.bin
pt_lat_Comb01.GeoPcDx
pt_lat_Single01.GeoPcDx
pt_lat_Split_L01.GeoPcDx
pt_lat_Split_L02.GeoPcDx
pt_lat_Split_R01.GeoPcDx
pt_lat_Split_R02.GeoPcDx
pt_lat_Twin01.GeoPcDx

C:\Program Files\Rail Simulator\Assets\Kuju\RailSimulator\RailNetwork\signals\UK Semaphore\UpQuad_Arms
UqArm_dist01.bin
UqArm_dist02.bin
UqArm_dist.bin
UqArm_home01.bin
UqArm_home02.bin
UqArm_home.bin
uqArm_anim_clr.ban
uqArm_anim_stp.ban
UqArm_dist.GeoPcDx
UqArm_home.GeoPcDx

C:\Program Files\Rail Simulator\Assets\Kuju\RailSimulator\RailNetwork\signals\UK Semaphore\Wooden_Posts
B Wooden CombSig_hd 1T.bin
B Wooden CombSig_hd.bin
B Wooden CombSig_hh 2T 2E.bin
B Wooden CombSig_hh.bin
B Wooden JuncSig L1_hh 2T 1E.bin
B Wooden JuncSig L1_hh Special 1.bin
B Wooden JuncSig L1_hh.bin
B Wooden JuncSig L2_dd.bin
B Wooden JuncSig L2_hh.bin
B Wooden JuncSig R1_hh.bin
B Wooden JuncSig R2_dd.bin
B Wooden JuncSig R2_hd.bin
B Wooden JuncSig T_hd.bin
B Wooden JuncSig T_hh.bin
B Wooden JuncSig X_h.bin
B Wooden Shunt Entry.bin
B Wooden Shunt Exit.bin
B Wooden Sig_d.bin
B Wooden Sig_h 1T.bin
B Wooden Sig_h 2T 1E.bin
B Wooden Sig_h Special 1.bin
B Wooden Sig_h Special 2.bin
B Wooden Sig_h Special 3.bin
B Wooden Sig_h.bin
pt_wd_Comb01.GeoPcDx
pt_wd_single01.GeoPcDx
pt_wd_Split_L01.GeoPcDx
pt_wd_Split_L02.GeoPcDx
pt_wd_Split_R01.GeoPcDx
pt_wd_Split_R02.GeoPcDx
pt_wd_Twin01.GeoPcDx

C:\Program Files\Rail Simulator\Assets\Kuju\RailSimulator\RailNetwork\signals\UK Semaphore\Sem_Shunt
B Shunt Signal Entry Mainline.bin
B Shunt Signal Entry.bin
B Shunt Signal Exit Mainline.bin
B Shunt Signal Exit.bin
pt_shunt.GeoPcDx
pt_shunt_ToGo.ban
pt_shunt_ToStop.ban

C:\Program Files\Rail Simulator\Assets\Kuju\RailSimulator\RailNetwork\signals\UK Semaphore\CommonScripts
Common UK Semaphore Script.lua
Common UK Semaphore Yard Entry Script.lua