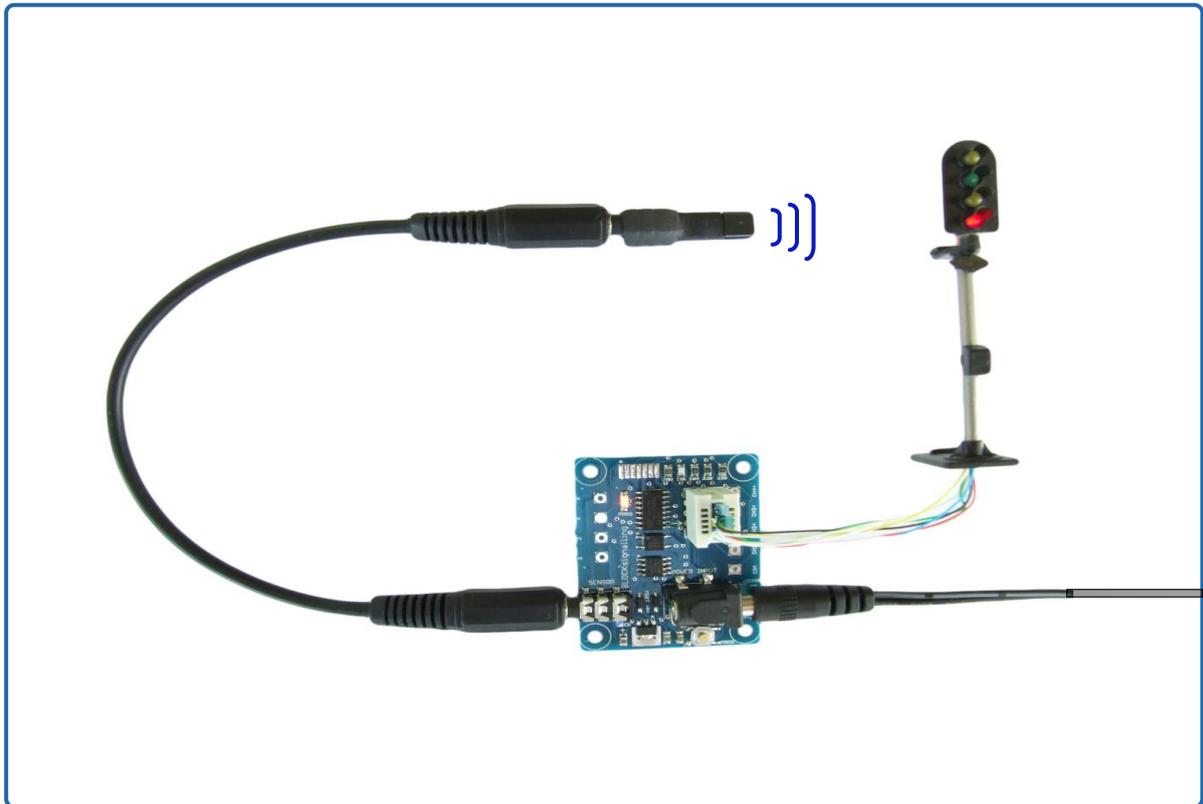


## PLUG & PLAY INFRA-RED SIGNAL CONTROLLER ASP1C



- Simple plug-in connections for the signal, sensor and power.
- Uses an infra-red sensor mounted below the track to detect trains passing above
- When a train is detected, the module triggers the signal to switch to red
- Signal automatically switches back to green (through yellow and double-yellow if appropriate)
- Flexible programming options to suit different signals and to allow adjustment of timings to suit
- Realistic fading between aspects.
- Yellow and Double-Yellow stages will change to red if another train passes.

Building on the success of our infra-red train detectors, this module boasts simplicity of connecting up, smooth fading between aspects, and the ability to be triggered from yellow or double-yellow stages back to red.

This Signal Controller detects trains by bouncing invisible Infra-Red (IR) light off the underside of the rolling stock, and detecting the light reflected back. Once triggered by the train, the module runs built-in programs to simulate the operation of 2-, 3- or 4-aspect signals.

The signal normally shows green. When the train passes the detector, the signal switches to red. Once the train has fully cleared the detector, the module switches the signal back to green (via yellow and double-yellow if appropriate).

The duration of the red, yellow and double-yellow stages can be adjusted, as can the time the sensor needs to be cleared before initiating the sequence returning to green and the sensitivity of the detection. Adjusting the time the sensor needs to be cleared can be useful to prevent incorrect detection of the train having passed due to the small gaps between the rolling stock.

This controller is designed for connection to signals which our simple flat connector pre-wired.

## **Features**

- No calibration required – works out of the box.
- No modifications required to rolling stock.
- Not affected by light or dark, or changes in light level.
- Designed and manufactured in the UK.
- Simple plug-together system.

## **Power Supply**

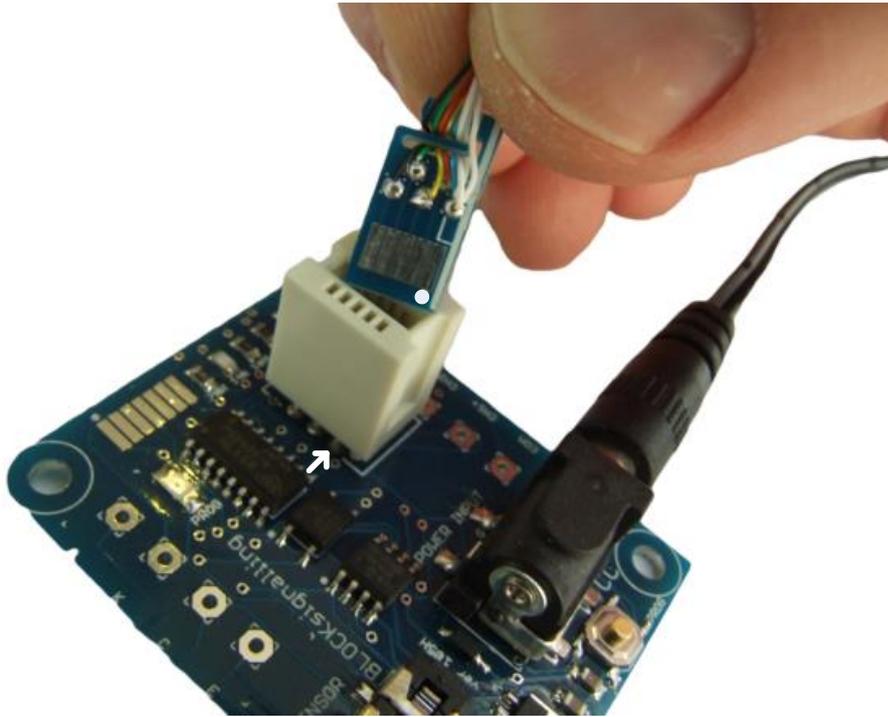
The module operates from a 12V DC power supply.

## Signal Connection

The module connects to signals with the special BLOCKsignalling flat connector.

Ensure the connector has its white dot closest to the white arrow printed on the module.

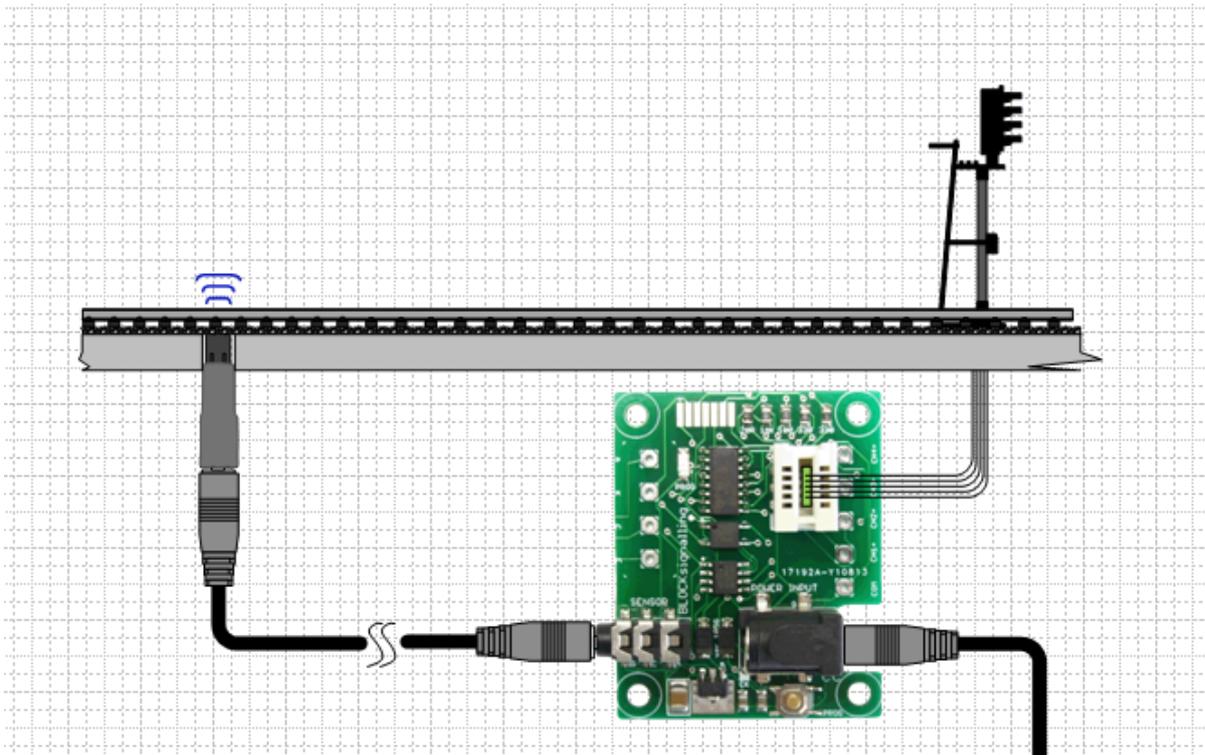
The module needs to be programmed for the number of aspects on the signal.



## Installation

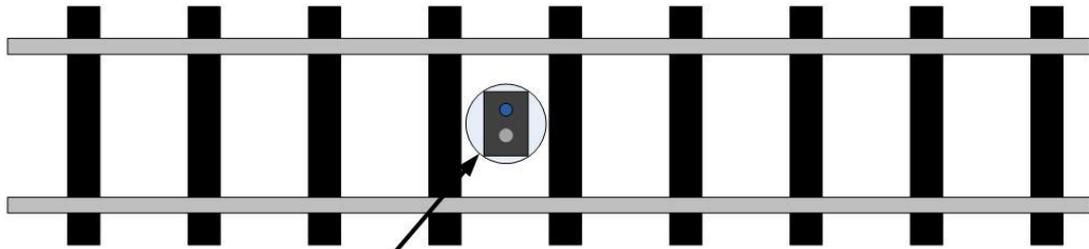
The Infra-Red sensor is normally installed below the track-bed.

The detection range of the unit is up to approximately 25mm from the face of the package when the default sensitivity is set (for dark surfaces with low levels of reflectivity).



The detector can be mounted in an 8mm hole drilled through the track baseboard. If required, the detector can be held in place using a small amount of blutack, expanded polystyrene or similar.

The led diameter is 2.2mm, so on smaller scales the leds can still have a clear view between the sleepers.



Detector Mounted in an  
8mm Hole below the Track

## Programming

As supplied, the module is programmed for 4-aspect signals. If you are using 3- or 2-aspect signals, then it will be necessary to reprogram the module.

Programming starts with the power off.

Plug in the sensor lead (with the sensor mounted at the end). Then hold the button on the module down and turn on the power. The led will begin to flash.

For each program there are two values to be stored (see later for details of the options available).

The red led on the PCB flashes at 1 second intervals. When the required number of flashes is seen (see later for the list of possible choices) the button is released to store the first value. At this point the led comes on for five seconds to confirm the value is stored.

The led then starts flashing again, and this time the button needs to be pressed to store the second value.

Once both values have been entered, the led flashes 10 times rapidly, and the module starts operating.

Each value entered can be up to 255 flashes. If more are seen, or the programming is aborted by switching off, then the programming must be repeated.

## Factory Reset

If you are in doubt about how the module is set up, you can reset the module to the factory settings.

To reset the module back to factory settings, switch off the power to the module and hold down the Push Button. Apply the power and continue holding the push button until **1 flash** of the led is seen. At this point, release the button. You will see a long flash of five seconds.

The led will begin flashing again. When you have seen **1 flash** press the button. You will see a long flash of five seconds and then 10 rapid flashes. The reset procedure is then complete and the module will restart with factory settings, and run the 4-aspect signal mode. If you make a mistake programming, simply repeat the process.

## Sensitivity Setting

The module is supplied with the sensitivity pre-set to suit most installations and should not need adjustment.

In locations such as tunnels, or when the module is not being used under the track bed, then it may be desirable to adjust the detection threshold.

The sensitivity is factory set to 5, and can be adjusted from 1 to 10 (with 1 being the most sensitive and 10 being the least sensitive).

	Trigger Threshold					
	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
Aluminium Foil (shiny side)	170mm	125mm	100mm	95mm	90mm	85mm
A4 White Paper	100mm	65mm	50mm	45mm	40mm	35mm
Matt Black Card	55mm	35mm	30mm	25mm	20mm	15mm
Shiny Black Plastic	45mm	30mm	25mm	20mm	18mm	15mm

To change the sensitivity, switch off the power to the module and hold down the Push Button. Apply the power and continue holding the Push Button until **9 flashes** of the led are seen. At this point, release the button. You will see a long flash of five seconds.

The led will begin flashing again. When you have reached the desired number of flashes to set the new sensitivity, press the button. You will see a long flash of five seconds and then 10 rapid flashes. The programming is then complete and the module will restart. If you make a mistake programming, simply repeat the process.

Performing a factory reset will reset the sensitivity setting back to 5.

## Program 2 (2-Aspect Signalling)

This program simulates the operation of a two aspect signal, which is normally showing green. The module searches for a train, and if one is detected in front of the sensor, the signal immediately switches to red.

Whilst the sensor is covered, the signal stays at red. As the train passes over the sensor, any gaps between the rolling stock which are shorter than the release time programmed are ignored.

Once the train has cleared the sensor, and the release time expires, then the "red time" timer starts. When this expires, the signal turns back to green and starts looking for trains again.

The "release time" can be adjusted if slow moving trains cause the signal to prematurely switch back to green before the train has cleared the sensor.

The "red time" can be adjusted to a realistic duration for a train to clear the section of track protected by the signal.

When supplied, or following a factory reset, the module will operate in 4-aspect mode. It needs to be reprogrammed as follows.

To select this program, switch off the power to the module and hold down the Push Button. Apply the power and continue holding the push button until **2 flashes** are seen. At this point, release the button. You will see a long flash of two seconds and then the led will begin flashing again.

When **2 flashes** have been seen press and hold the button. You will see a long flash of five seconds and then 10 rapid flashes. The button can now be released and the programming is complete. The module will start running the program. If you make a mistake programming, simply repeat the process.

### Program 3 (3-Aspect Signalling)

This program simulates the operation of a three aspect signal, which is normally showing green. The module searches for a train, and if one is detected in front of the sensor, the signal immediately switches to red.

Whilst the sensor is covered, the signal stays at red. As the train passes over the sensor, any gaps between the rolling stock which are shorter than the release time programmed are ignored.

Once the train has cleared the sensor, and the release time expires, then the "red time" timer starts. When this expires, the signal switches to amber and the "yellow timer" starts.

When this expires, the signal switches back to green and starts looking for trains again.

The "release time" can be adjusted if slow moving trains cause the signal to prematurely switch back to green before the train has cleared the sensor.

The "red time" can be adjusted to a realistic duration for a train to clear the section of track protected by the signal.

The "yellow time" can be adjusted to a realistic duration for the scale.

When supplied, or following a factory reset, the module will operate in 4-aspect mode. It needs to be reprogrammed as follows.

To select this program, switch off the power to the module and hold down the Push Button. Apply the power and continue holding the push button until **2 flashes** are seen. At this point, release the button. You will see a long flash of two seconds and then the led will begin flashing again.

When **3 flashes** have been seen press and hold the button. You will see a long flash of five seconds and then 10 rapid flashes. The button can now be released and the programming is complete. The module will start running the program. If you make a mistake programming, simply repeat the process.

## Program 4 (4-Aspect Signalling)

This program simulates the operation of a four aspect signal, which is normally showing green. The module searches for a train, and if one is detected in front of the sensor, the signal immediately switches to red.

Whilst the sensor is covered, the signal stays at red. As the train passes over the sensor, any gaps between the rolling stock which are shorter than the release time programmed are ignored.

Once the train has cleared the sensor, and the release time expires, then the "red time" timer starts. When this expires, the signal switches to yellow and the "yellow timer" starts.

When this expires, the signal switches to double yellow and the "double yellow timer" starts. When this expires, the signal switches back to green and starts looking for trains again.

The "release time" can be adjusted if slow moving trains cause the signal to prematurely switch back to green before the train has cleared the sensor.

The "red time" can be adjusted to a realistic duration for a train to clear the section of track protected by the signal.

The "yellow time" and "double yellow time" can be adjusted to a realistic duration for the scale.

To use this mode, the module needs to be reprogrammed as follows.

To select this program, switch off the power to the module and hold down the Push Button. Apply the power and continue holding the push button until **2 flashes** is seen. At this point, release the button. You will see a long flash of two seconds and then the led will begin flashing again.

When **4 flashes** have been seen press and hold the button. You will see a long flash of five seconds and then 10 rapid flashes. The button can now be released and the programming is complete. The module will start running the program. If you make a mistake programming, simply repeat the process.

## **Changing the Timing of each Phase**

The individual time for each of the phases can be adjusted to suit (the default values are shown in the programming diagram below). Once you are happy with the operation of the train detection, you will probably want to change these to more realistic values.

### **To change the Red Time:**

Switch off the power for 5 seconds. Press the push button on the PCB, and switch the power back on.

The red led on the PCB flashes at 1 second intervals. When 3 flashes have been seen, the button is released to store the first value. At this point the led comes on for five seconds to confirm the value is stored.

The led then starts flashing again, and this time the button needs to be pressed to store the second value (the time you want the red led to be lit, for example 10 flashes for 10 seconds).

When the button is released, the led flashes 10 times rapidly, and the module starts operating.

### **To change the Yellow Time:**

Switch off the power for 5 seconds. Press the push button on the PCB, and switch the power back on.

The red led on the PCB flashes at 1 second intervals. When 4 flashes have been seen, the button is released to store the first value. At this point the led comes on for five seconds to confirm the value is stored.

The led then starts flashing again, and this time the button needs to be pressed to store the second value (the time you want the yellow led to be lit, for example 10 flashes for 10 seconds).

When the button is released, the led flashes 10 times rapidly, and the module starts operating.

### **To change the Double-Yellow Time:**

Switch off the power for 5 seconds. Press the push button on the PCB, and switch the power back on.

The red led on the PCB flashes at 1 second intervals. When 5 flashes have been seen, the button is released to store the first value. At this point the led comes on for five seconds to confirm the value is stored.

The led then starts flashing again, and this time the button needs to be pressed to store the second value (the time you want both yellow leds to be lit, for example 10

flashes for 10 seconds).

When the button is released, the led flashes 10 times rapidly, and the module starts operating.

## **Other Programming Options**

There are a number of parameters which can be adjusted if you wish to alter the operation of the module.

### **Release Time**

This is the time that the infra-red sensor must be continuously unobstructed for the module to confirm the train has passed. This allows for gaps between the carriages of variable reflectivity of the underside of the train.

The default setting is 2 seconds. A value of between 1 and 255 seconds is possible.

### **Lamp Fade-Down Rate**

This is the rate at lamp (leds) dim down.

The default setting is 3 which represents the appearance of a filament lamp. If the effect of an led aspect is required, then set this to 9.

### **Lamp Fade-Up Rate**

This is the rate at lamp (leds) brighten when switched on.

The default setting is 4 which represents the appearance of a filament lamp. If the effect of an led aspect is required, then set this to 9.

### **Maximum Led Brightness**

The leds are normally set to operate at full brightness, with this set to 7.

This value can be reduced if the leds appear brighter than required.

### **Gap Between Phases**

This variable set the gap between each aspect switching, to represent the operation of relay interlock.

The default value is 2. This variable can be set from 1 to 9.

## Program Flow Diagram

The diagram below shows all the programming options.

Programming is performed by inserting a link between the A and K terminals (or by having the detector wired in place) and holding down the Push Button when switching on the power.

The red led on the PCB flashes at 1 second intervals. When the required number of flashes is seen (see later for the list of possible choices) the button is released to store the first value. At this point the led comes on for five seconds to confirm the value is stored.

The led then starts flashing again, and this time the button needs to be pressed to store the second value.

Once the two values to be stored are entered, the led flashes 10 times rapidly, and the module starts operating.

Most values entered can range between 1 and 255 (see below for limits). If more are seen, or the programming is aborted by switching off, then the programming must be repeated.

