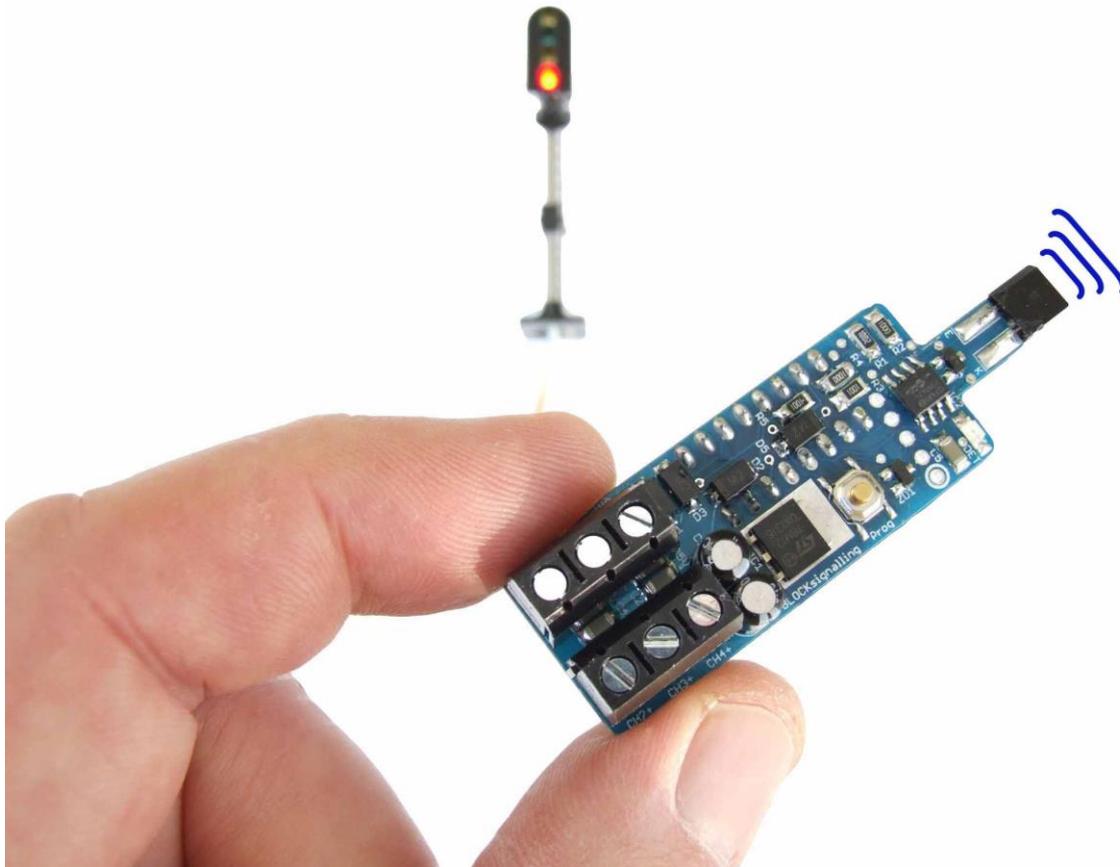


ASPECT CONTROLLER ASP1-NS



- Controlling multi-aspect signals on model railways has never been easier
- Detects trains passing signals using its in-built infra-red sensor
- Operates from 8V to 25V DC, 8V to 16V AC, or uses DCC as a power feed and feeds signals at 12V
- Fades leds in and out to simulate incandescent bulbs
- Very simple to connect up to signals
- No soldering required, all components are ready wired-up
- No programming required (but you can adjust all settings if you wish)

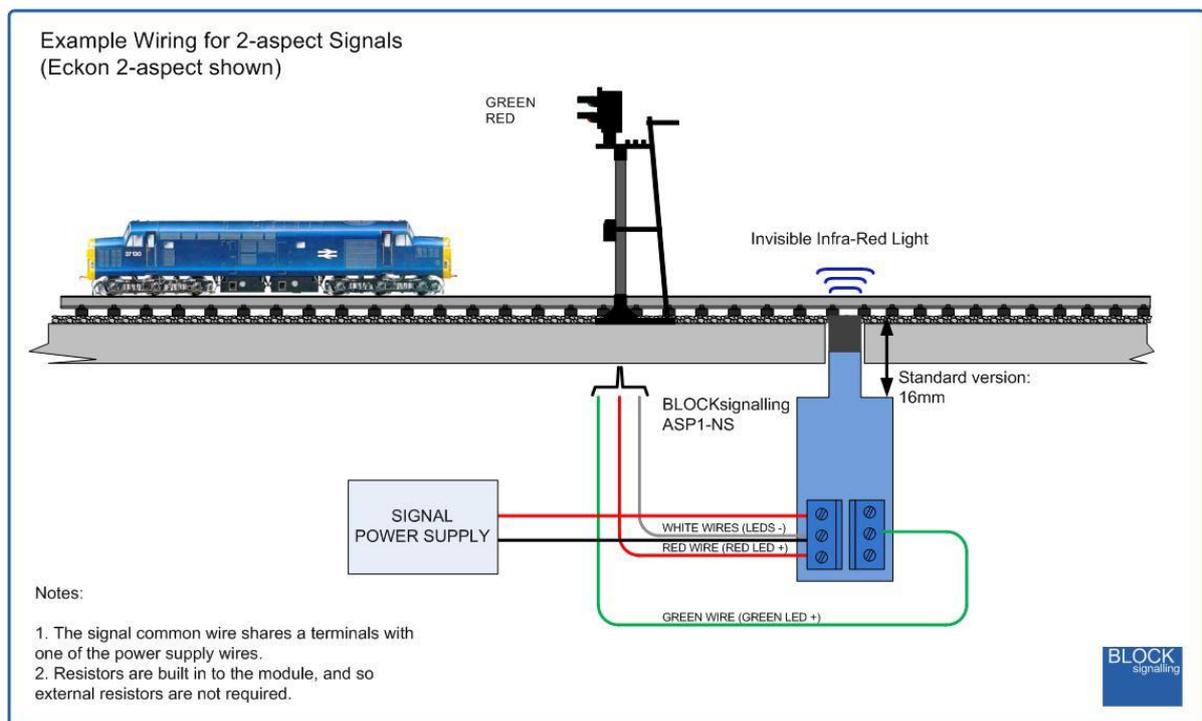
We love model railways with light signals. You can operate them from toggle switches when you only have a couple of aspects to operate, but when it comes signals with more aspects the wiring can become complex.

We were keen to provide a solution that would add some simple automation to 2-, 3- or 4-aspect signals, without the need for soldering, programming or making any additional connections.

The power feed connects to two terminals, with up to 5 wires from the signal connecting to the remaining terminals (the ground terminal has two wires connected, the signal common and ground).

You can power the module from 8V-25V DC, 12V to 16V AC, or from a DCC feed. The module reduces the supply voltage down to 12V to feed the signals. External resistors are not required, as these are built into the module.

Simply drill an 8mm hole through the baseboard between the sleepers and insert the sensor from below (the sensor only needs a 2mm gap to see between the sleepers so there should be no problems with N gauge). Invisible infra-red light is projected upwards and any trains passing overhead will trigger the circuit and will operate the signal automatically. You can test this by waving your hand over the sensor, and the signal should operate.



Connecting Up

The module has six terminals.

Vin This is one side of the AC or DCC supply input feeding the module (or the positive feed if a DC supply is being used)

GND This is the other side of the AC or DCC supply input feeding the module (or the negative feed if a DC supply is being used). It is also the signal common wire.

CH1+ This is the positive feed to the RED aspect

CH2+ This is the positive feed to the YELLOW aspect (for 3- and 4-aspect signals)

CH3+ This is the positive feed to the GREEN aspect

CH4+ This is the positive feed to the SECOND YELLOW aspect (for 4-aspect signals)

Resistors are built into the module, so no external resistors are necessary. If you already have resistors wired in, then they can be left in place if you wish, although the led brightness may be slightly diminished.

Power Supply

The module will operate reliably with a power supply in the range of 8V to 25V DC, or 12V to 16V AC, or a DCC feed from the track for example.

When connecting a DC supply, connect the negative to the GND terminal and the positive to the Vin terminal. If the connections are accidentally reversed, the module will not function, but no damage will result.

When connecting AC or DCC, the connections can be made either way around.

Operation

With the power switched on, the red led on the PCB should flicker rapidly.

If a train now passes over the sensor, or you wave your hand close to the sensor, the signal will switch to danger.

The PCB led now flickers at a slower rate, and this indicates that the module is now looking for the end of the train to clear the sensor. Gaps between carriages of up to 4 seconds are ignored (see the programming section below if you want to adjust this).

Once it is determined the train has completely cleared the sensor, there is a final short delay (also programmable if you wish) before module switches back to clear.

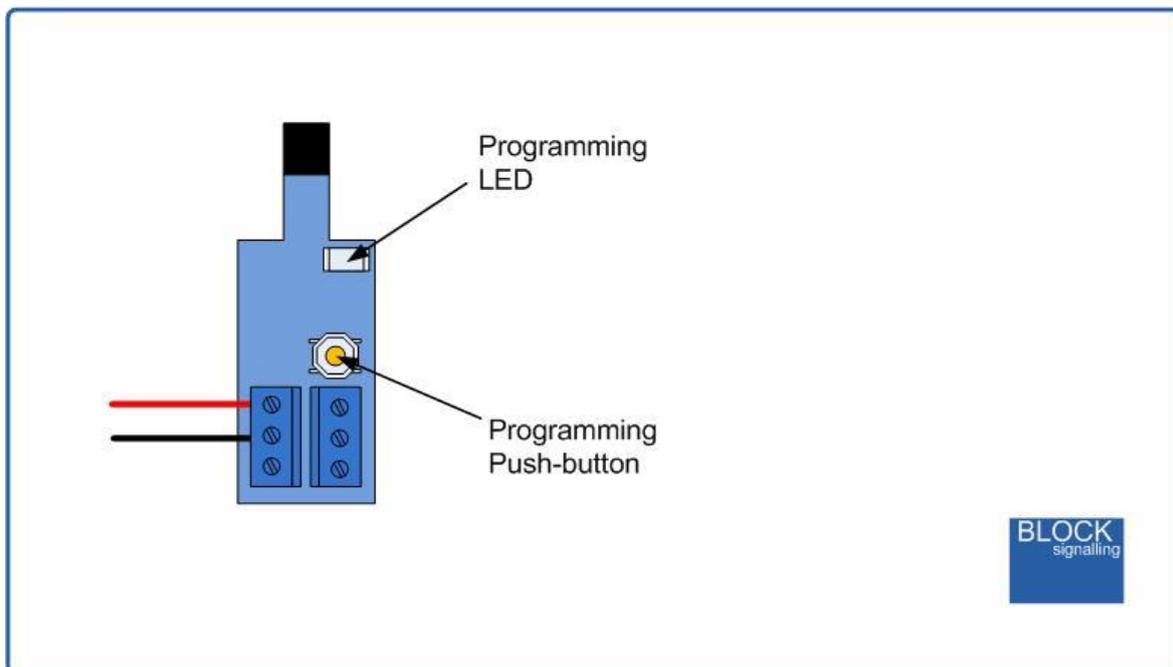
With 3- and 4-aspect signals the intermediate states of yellow and double yellow will be shown. The timings for these states are adjustable if required.

Programming

The module will operate the signal straight out of the packet.

The default program is to operate a 4-aspect signal, so if you connect a signal with fewer aspects it will be necessary to reprogram the module.

Programming is performed holding down the Push Button when switching on the power.



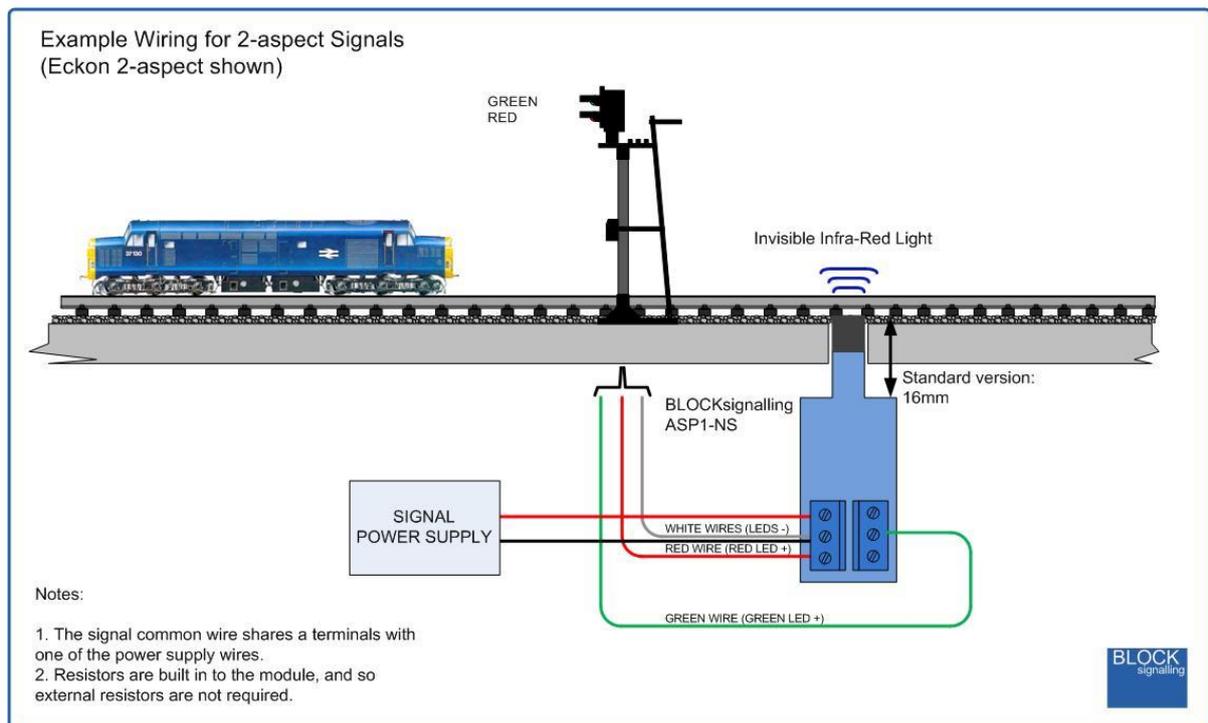
The red led on the PCB flashes at 1 second intervals. When the required number of flashes is seen (see later for the list of possible choices) the button is released to store the first value. At this point the led comes on for five seconds to confirm the value is stored.

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.

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.

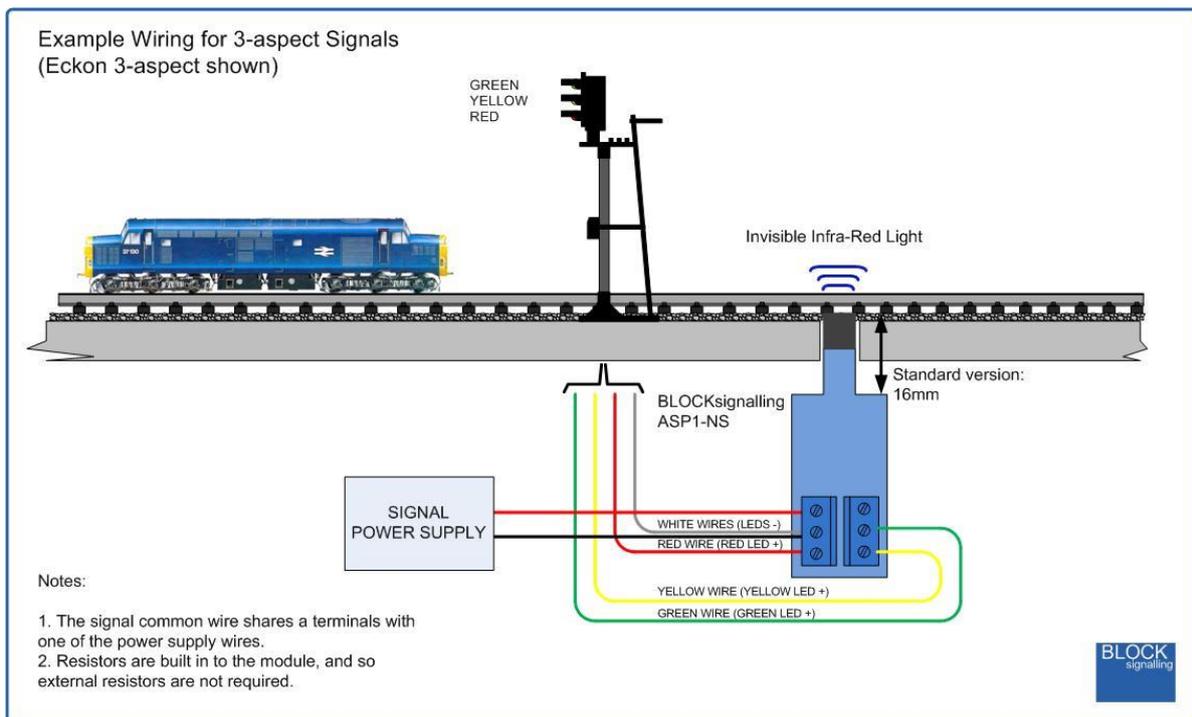
When supplied, or following a factory reset, the module expects to be connected to a 4-aspect signal. It needs to be reprogrammed as follows.

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 "amber 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.

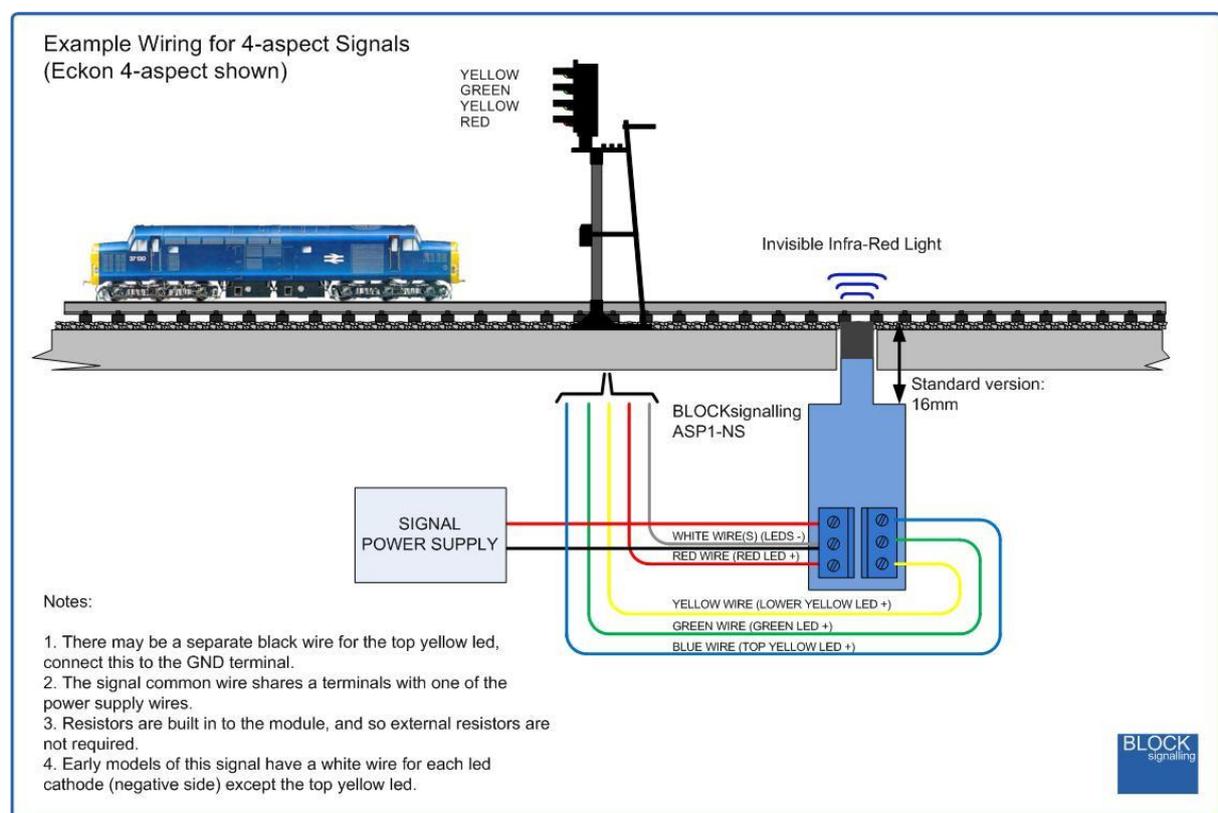
The "amber time" can be adjusted to a realistic duration for the scale.

When supplied, or following a factory reset, the module expects to be connected to a 4-aspect signal. 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 amber and the "amber timer" starts.

When this expires, the signal switches to double amber and the "double amber 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 "amber time" and "double amber" 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. If it has been reprogrammed for fewer aspects, 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** 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.

An alternative wiring method using fewer resistors is shown below:

Changing the Timing of each Phase

The individual time for each of the phases can be adjusted to suit (as supplied they are set to 1 second each, which is ideal for initial testing). 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 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.

Following the diagram is a detailed explanation of all the settings.

