

Level Crossing Module with Real Sound

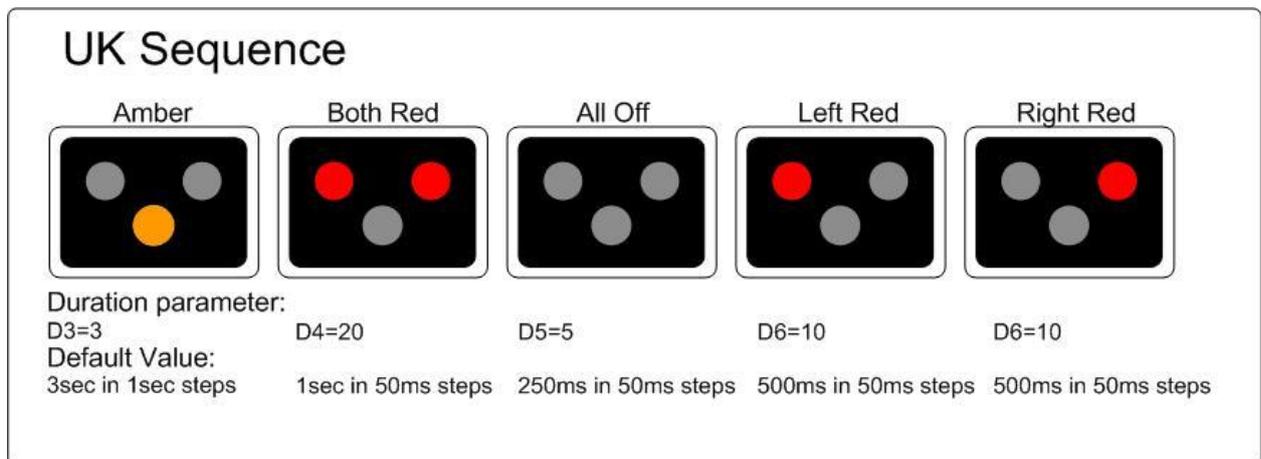
- Uses an infra-red sensor to detect a train passing (can also be triggered by reed relay, push -button, switch, or simply supplying power to the module)
- Automatically operates lights and sounder when triggered
- Module reproduces a preselected sound clip from 18 possible choices (gongs, sounders, bells, Yodalarm, etc)
- At the same time, the conventional light sequence of a single yellow light, followed by alternating red flashing lights commences
- Automatically stops the sounder after 10 seconds
- The module is fully programmable to adjust the flash rate, duration of the sequence, and so on

The BLOCKsignalling LCS4 Level Crossing Module provides a realistic simulation of a full sized level crossing, operating the lights and sounder once triggered. An infra-red sensor is included which will trigger the module when infra-red light is reflected from the underside of a train passing above the sensor. The flashing lights will continue to operate whilst the whole of the train passes over the sensor, and will only stop after the sensor is cleared (there is an additional adjustable delay which can be set after the train has cleared the sensor so the flashing lamps cease at an appropriate point).

Alternatively, the A and K terminals can be linked, in which case the module will be triggered as soon as the power is applied, playing the sound clip and then continuing to flash the red leds alternately until the power is removed. If a push button or reed switch is wired between the A and K terminals, a brief contact closure will play the sound clip and operate the lights for 10 seconds. If a push button is used, and held down, the lights will continue flashing until the button is released.

Timing

The UK sequence is shown below. The duration of each phase can be easily adjusted during the programming to suit individual requirements.



The module can be used with between one and four sets of lights, depending on the complexity of the layout, and whether the crossing is visible from both sides or not.

Sounder

The sounder provides a 10 second clip of one of the 18 possible level crossing sounds selected from a number of countries. The default is the UK Yodalarm sound, which is defined in the following document:

Railway Group Standard G/RT7012 states that the audible alarm shall comprise of the repetition of two alternating tones of equal duration with frequencies of 800Hz and 1000Hz. This sequence shall repeat approximately every 0.5 second. Where it is required to give warning of a second train approaching the rate of repetition shall be increased to approximately every 0.25 second.

The speaker provided can be located on the underside of the baseboard, or within a structure such as a building on the topside. Some experimentation will be required to achieve a suitable sound level, by the use of wadding if necessary to reduce the perceived volume.

Power Supply

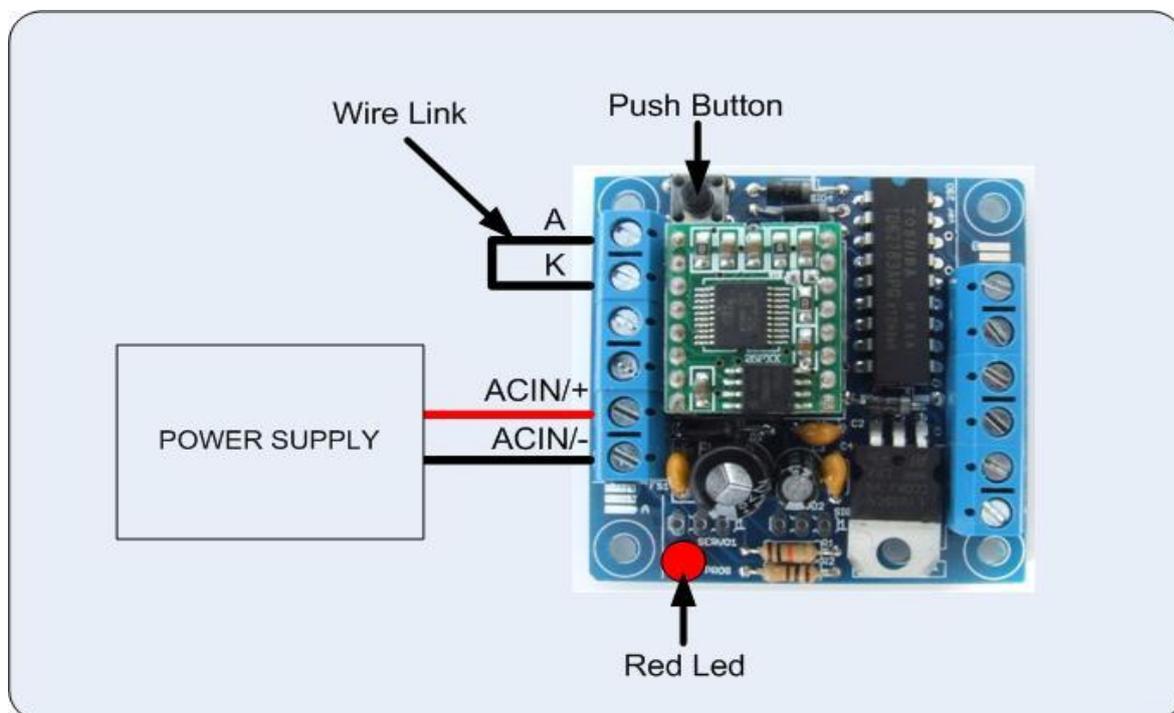
The module is designed for use with a DC power supply of between 10V and 25V, or an AC power supply of between 10V and 16V.

Where there is a choice, the recommended power supply is 12V DC.

Please double check all wiring before applying power, as incorrect wiring can instantly cause damage to the unit.

Programming Procedure

Programming is performed by inserting a link between the A and K terminals and holding down the Push Button when switching on the power (this link will be removed shortly and the infra-red sensor connected).



When programming, there are two values to be entered.

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 first value is stored.

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

Now the two values to be stored have been entered, the led flashes 10 times rapidly, and the module starts operating.

Each value entered can range between 1 and 255. If more flashes are seen, or the programming is aborted by switching off, then the programming must be repeated.

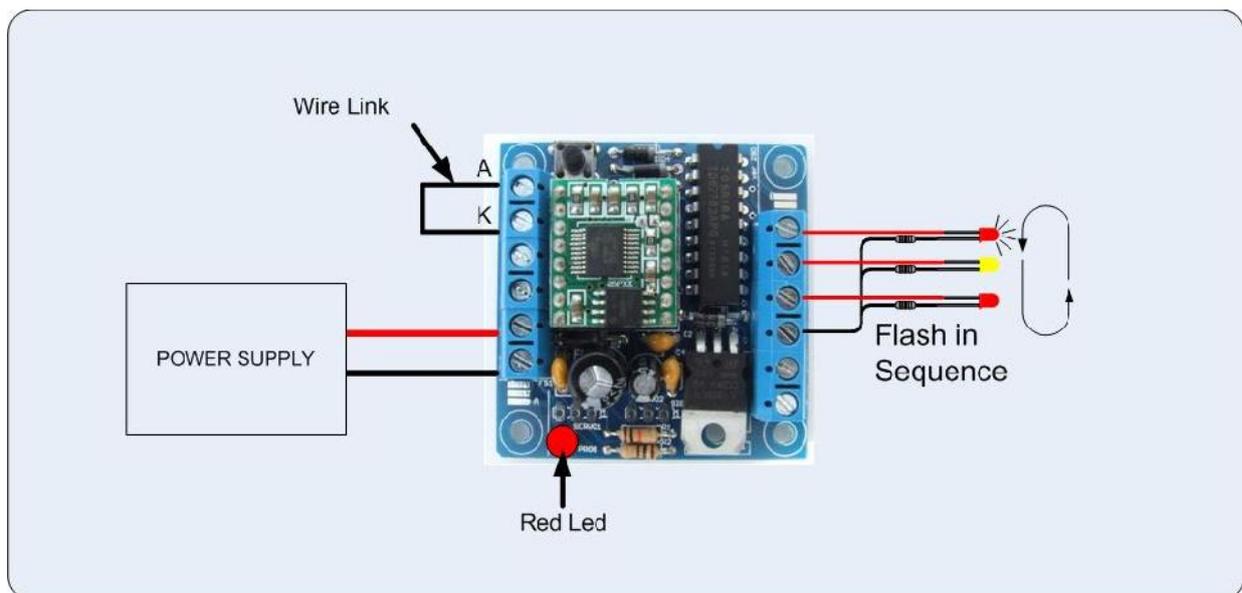
Testing Wiring

As supplied, the module will programmed to run a test sequence.

The module will start with the led on the PCB flashing at a slow rate. If a finger is brought close to the infra-red sensor, the flashing rate will increase.

Once the led has flashed 20 times, a lamp test sequence will begin. First all outputs are switched on, then they all go off except ch1. Then ch1 is switched off and ch2 comes on. This sequence continues until ch3 is on and then all the outputs are switched off and the sequence is repeated. Each step takes 1 second. The led on the PCB switches on and off with each step (providing A and K are linked). This will run for 5 cycles.

After this is complete, the module will play each of the 18 sound samples, and then return to cycling the outputs.



This test sequence is ideal for vhecking the system wiring before programming for the actual requirement.

To select this program (if not already selected), 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** 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 seen **1 flash** press the button. You will see a long flash of five seconds and then 10 rapid flashes. The programming is then complete and the will start running the lamp test program. If you make a mistake programming, simply repeat the process.

Factory Reset

Resetting back to factory settings will allow the module to restart with known settings and is useful if there may have been a mistake made in programming.

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 lamp test mode. If you make a mistake programming, simply repeat the process.

The module is reset and will run in the test mode (see above).

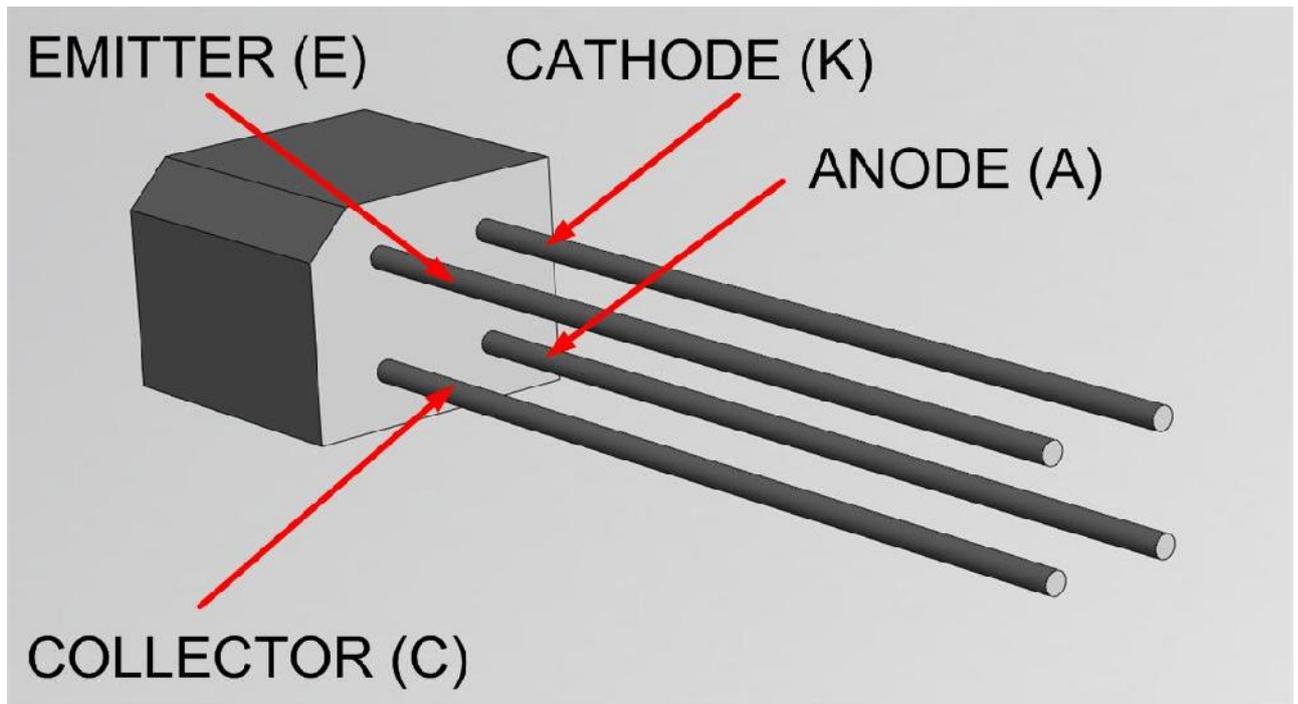
PCB LED

The LED mounted on the PCB has four modes of operation:

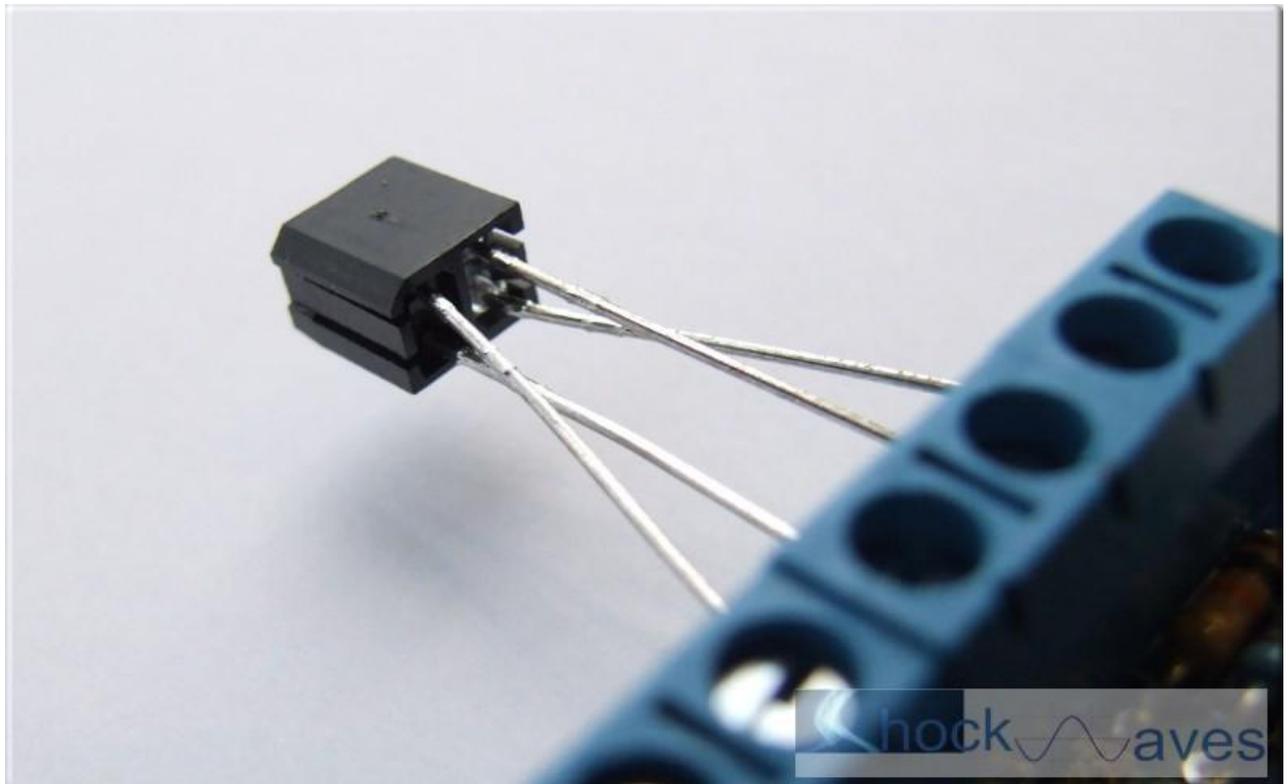
1. full brightness (during programming)
2. 10% brightness, filckering (whilst searching for a train)
3. 50% brightness, flashing (in programs where the rear of the train is being detected, the 50% brightness flashing will continue for four seconds after the train has cleared the sensor. This is to prevent incorrect detection due to gaps between the rolling stock. This mode is not used on this module.)
4. off (module is no longer searching for a train)

Testing the Infra-red Detection

An Infra-Red source and Infra-Red detector are moulded into a single 5mm x 6.5mm package that can be located below the track bed to reflect light off rolling stock.



Identify the leads from the diagram and connect to the terminals marked A, K, C and E on the PCB.



The wires can be extended using small chocolate block and extra lengths of cable if required (not supplied).

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 IRTD 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 | | | | | |
|-----------------------------|-------------------|----------|----------|----------|----------|----------|
| | 2 | 3 | 4 | 5 | 6 | 7 |
| 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 |

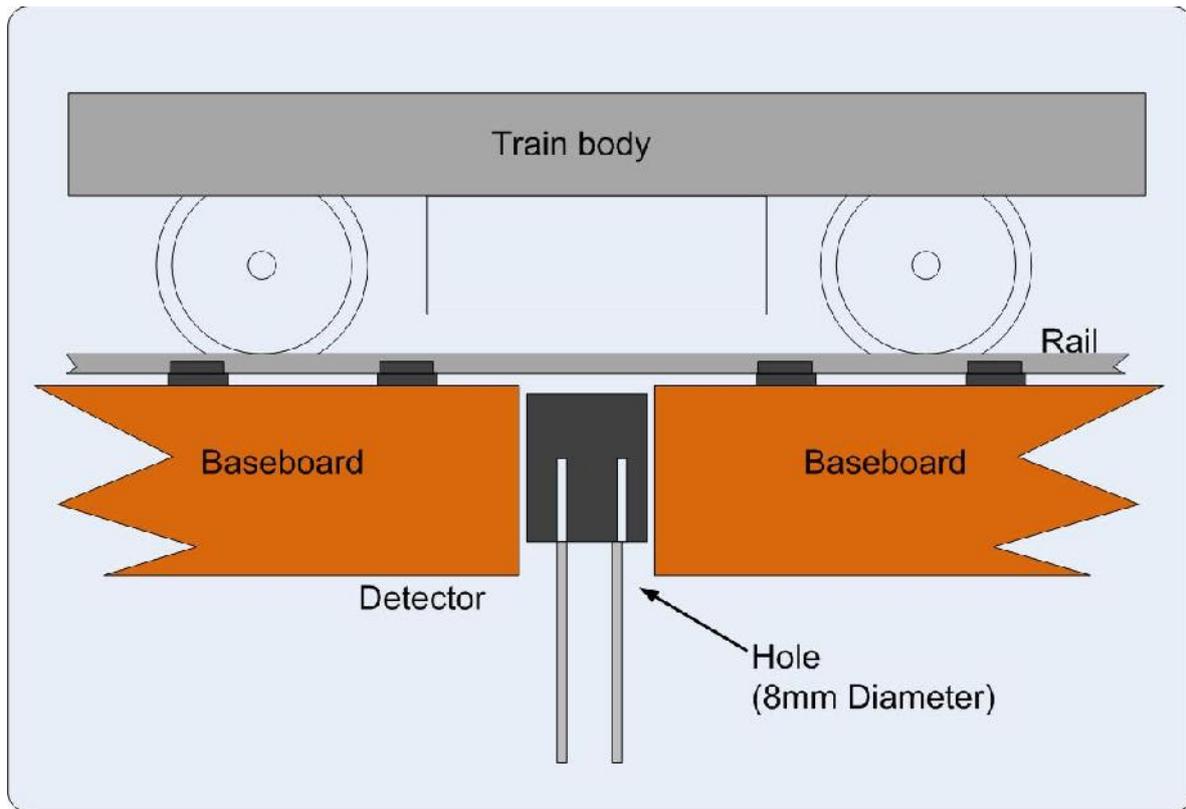
To change the sensitivity, switch off the power to the module and hold down the Push Button. Apply the power and continue holding the Push Button until **9 flashes** of the led are seen. At this point, release the button. You will see a long flash of five seconds.

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.

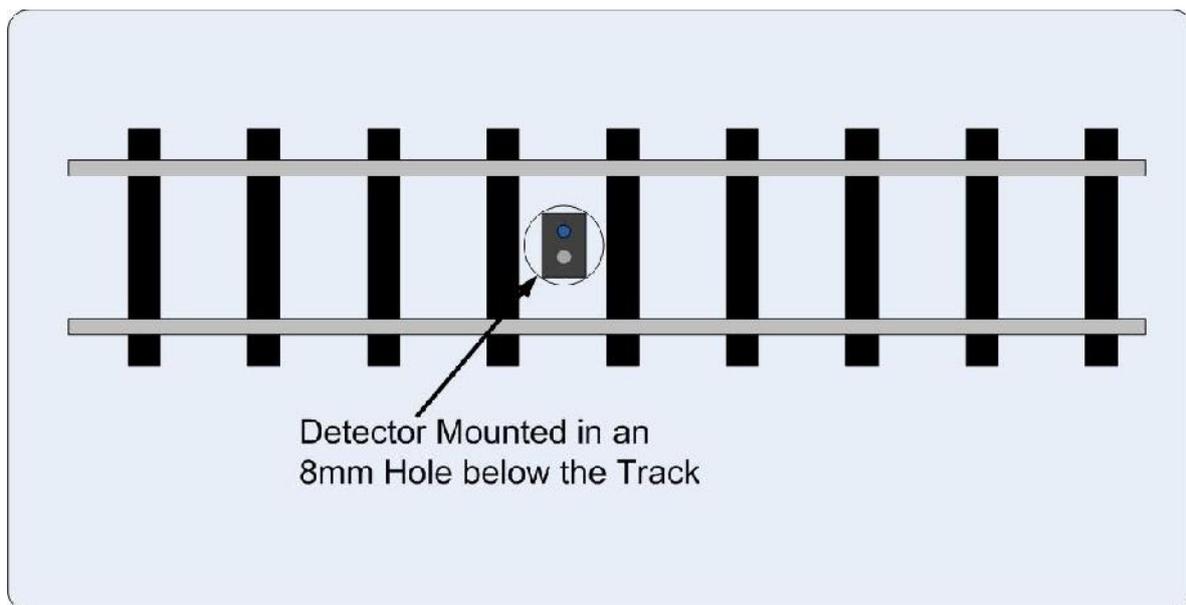
Installation

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 normal 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.



Selecting the Program

There are five modes available:

1. Test Mode
2. Triggered by connecting together the C and E terminals with a switch, push button, etc. No sound.
3. Triggered by an infra-red sensor connected to terminals A,K,C and E. No sound.
4. Triggered by connecting together the C and E terminals with a switch, push button, etc. With sound.
5. Triggered by an infra-red sensor connected to terminals A,K,C and E. With sound.

For programs 2 and 4, the program will be run as soon as the C and E terminals are linked together. This will start the sound clip (program 4 only), and commence the flashing light sequence.

Once the clip has ended, the lights will continue to flash, as long as the C and E terminals are shorted together.

As soon as the C and E terminals are disconnected from each other, a countdown timer starts. When this timer has reached zero, the flashing lights sequence ends.

This timer can be adjusted by programming setting 8 (see below).

For programs 3 and 5, the program will be run as soon as a reflective object appears in front of the IR sensor. This will start the sound clip (program 5 only), and commence the flashing light sequence.

Once the clip has ended, the lights will continue to flash, as long as a reflective object appears in front of the IR sensor.

As soon as the sensor is unobstructed, a countdown timer starts. When this timer has reached zero, the flashing lights sequence ends.

This timer can be adjusted by programming setting 8 (see below).

To select the required 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** 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 seen **the number of flashes representing the program require**, 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 start running the program. If you make a mistake programming, simply repeat the process.

Adjusting the Timing for each Phase

To change the timing of each phase from the factory settings, first refer to the diagram at the top of this page to identify the individual parameter to change. For instance, to change the "both red" duration you will need to change parameter D4.

This parameter is set in 50ms steps, so to set the time to 500ms (half a second), we will set the second parameter to 10. For those values set in 1 second steps, simply set the number of seconds required.

To change D4 to 500ms, we need to let the led flash 4 times (to select parameter D4) and then 10 times (to select 500ms seconds). Other parameters are adjusted in a similar way.

The full procedure is as follows:

Switch off the power to the module and hold down the Push Button. Apply the power and continue holding the push button until **4 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 seen **10 flashes** 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 start running the program. If you make a mistake programming, simply repeat the process.

Sound Clip Selection

The module is pre-loaded with a selection of 18 sound clips which are played out in order following a factory reset. The default clip played is clip number 1.

Many of these audible indications are used in more than one country, but their predominant use is shown in the table below.

1. 1. Yodalarm Electronic Sounder (UK)
2. 2. Continuously ringing bell at a very fast rate, similar to a firebell (UK)
3. 3. Continuously ringing bell at a very fast rate, similar to a firebell - alternative tone (UK)
4. 4. Plunger Type Bells, in pairs. Medium rate. (Germany)
5. 5. Gong type bell, rung at a fast rate. (US)
6. 6. Slow Swinging Arm (0.5Hz rate) (US)
7. 7. Alternate bells (cowbell style) with moving overlap (US)
8. 8. Slow Swinging Arm - alternative (US)
9. 9. Gong Sound at a 2Hz rate (US)
10. 10. Continuously ringing bell at a very fast rate, similar to a firebell (France)
11. 11. Single Repeating Plunger type Bell at a slow rate (France)
12. 12. Varying overlapping bells, similar to Cow Bell type (Finland)

13. 13. Varying overlapping bells, similar to Cow Bell type - alternative (Finland)
14. 14. Electronic Sounder (Japan)
15. 15. Slow bell at a 0.5Hz rate (Italy)
16. 16. Slow bell at a 0.5Hz rate - alternative (Italy)
17. 17. Alternate bells (cowbell style) with varying overlap (Italy)
18. 18. Single repeated bell at a 1Hz rate (Italy)

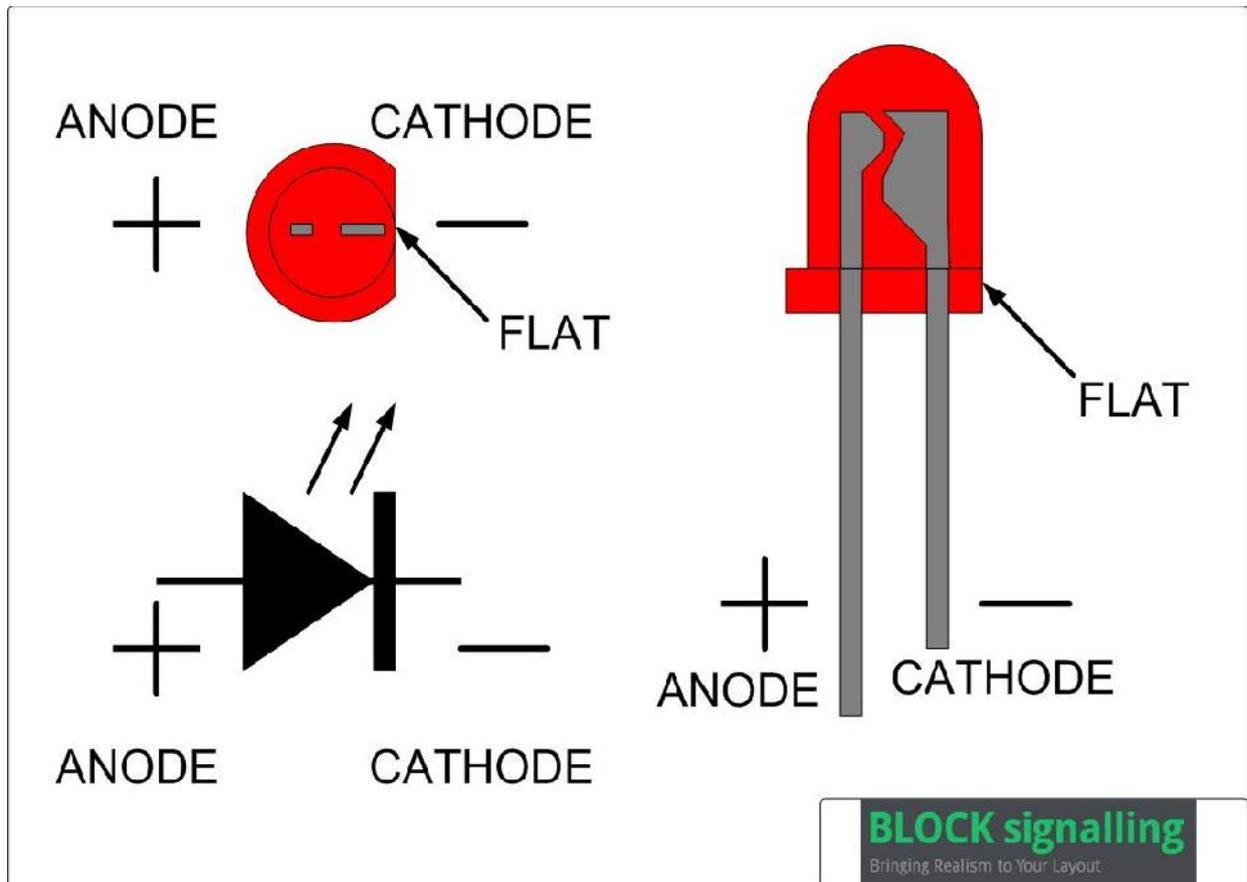
To select an alternative sound clip, switch off the power to the module and hold down the Push Button. Apply the power and continue holding the push button until **10 flashes** of the led are seen. At this point, release the button. You will see a long flash of five seconds.

The led will begin flashing again. When you have seen **the number of flashes representing the number of the sound clip**, 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 start running the program. If you make a mistake programming, simply repeat the process.

Led Connection

When using leds it is important to connect them the right way around.

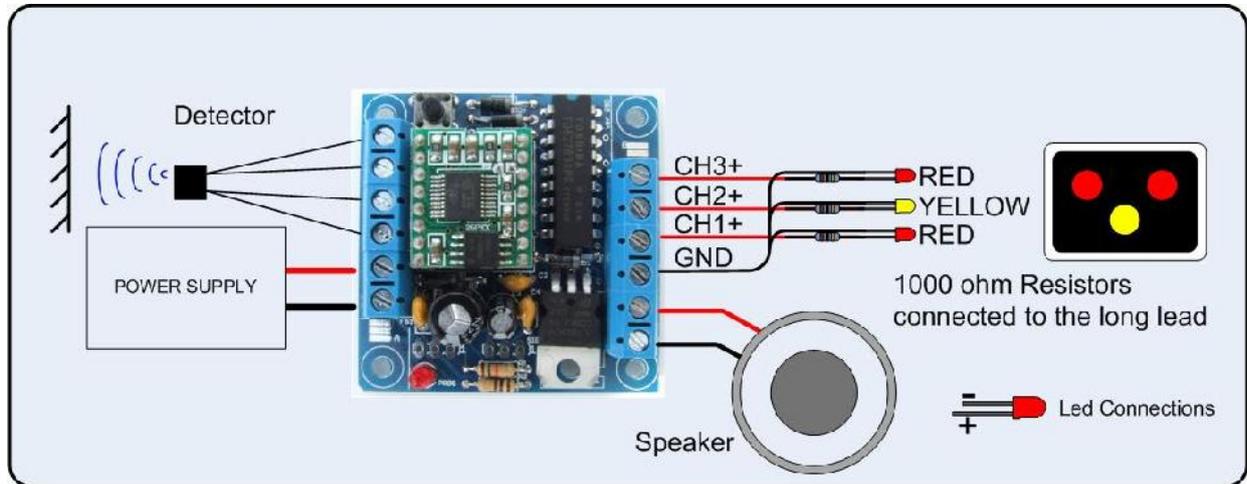
The negative lead (cathode) is identified by a flat on the side of the led body, and by having a shorter lead.



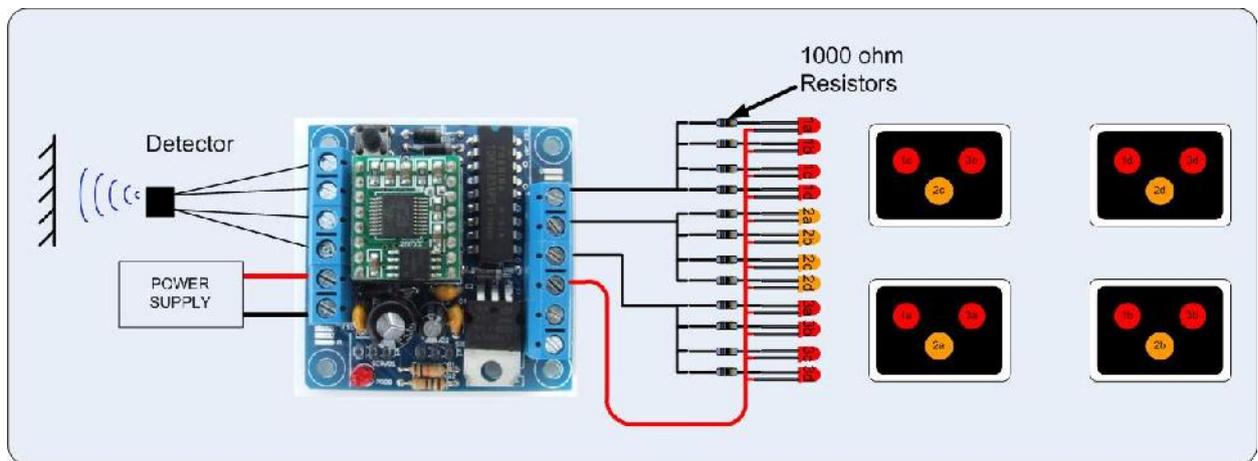
Connecting the Unit

The diagram below shows the connection to individual leds, for a single light head.

The loudspeaker is connected to the speaker terminals (which may be screw terminals or a plug and socket depending on which size of loudspeaker is included with the module). The speaker wiring can be connected either way around.

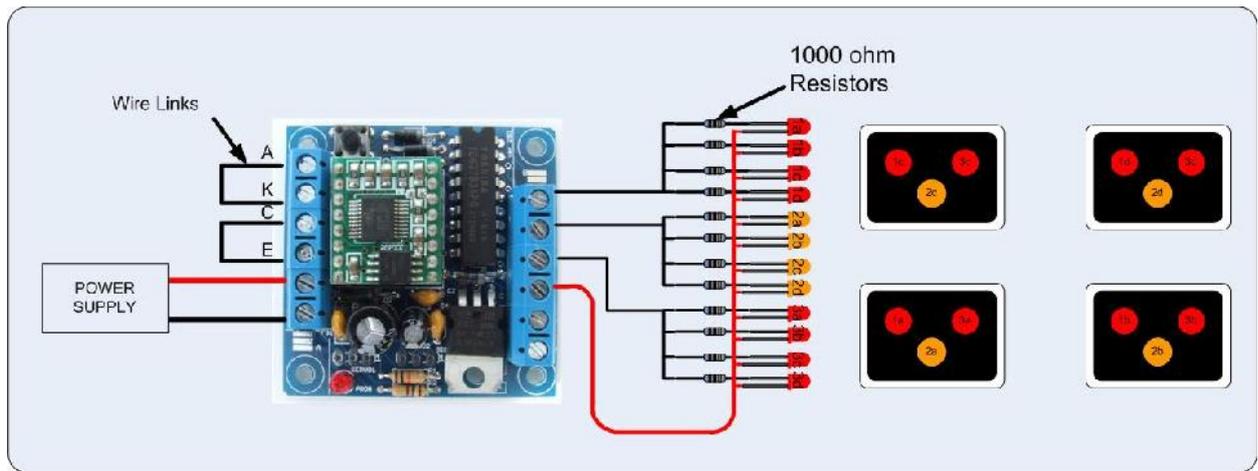


Up to four light heads can be connected in total (loudspeaker omitted for clarity).



If you are not using the infra-red detection, then you can disconnect the sensor, and just fit a short link wires between A-K and C-E.

Program 2 will also need to be selected to allow the module to operate the sequence as soon as power is applied.

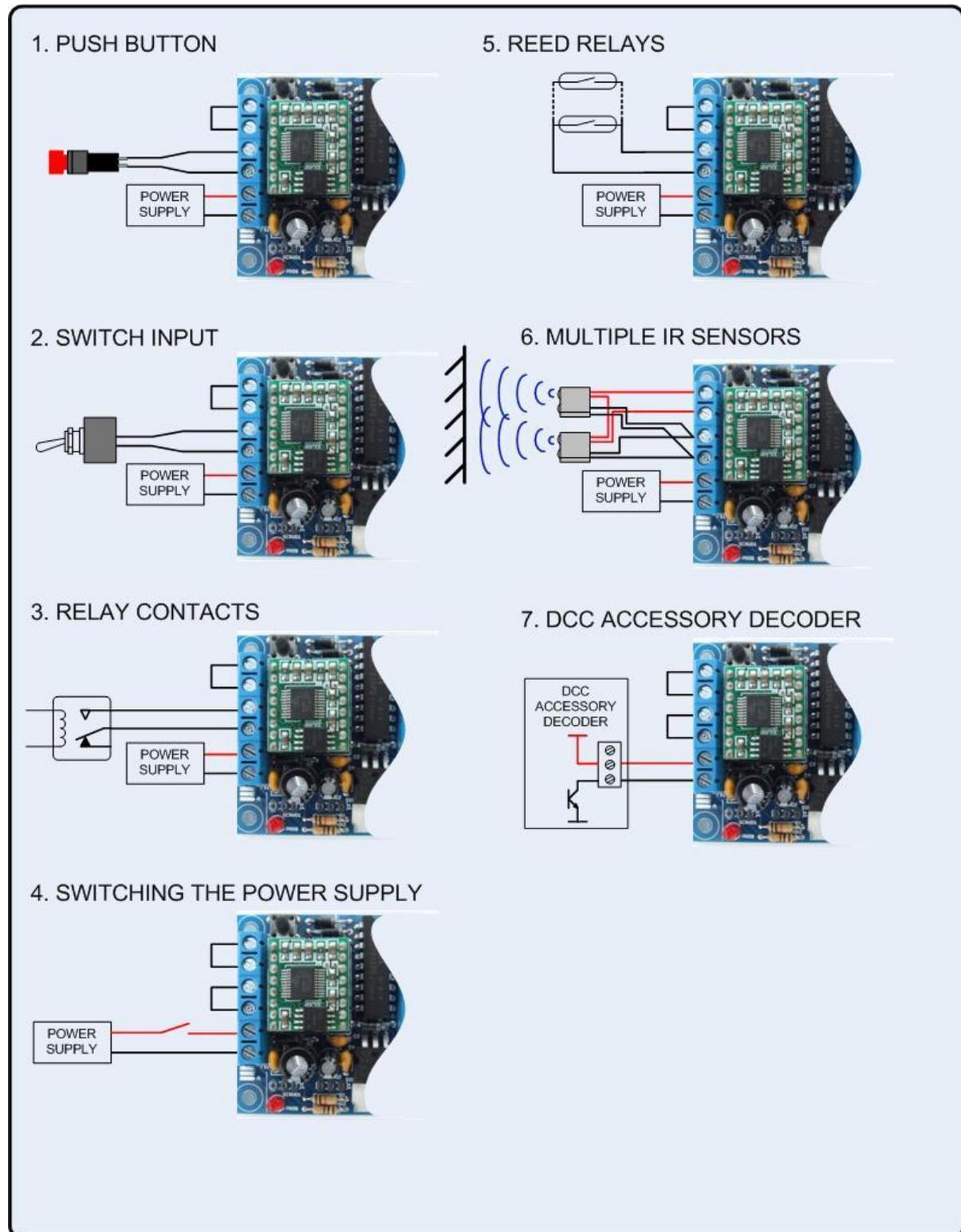


If you are using fewer light heads, then simply omit those wires and leds.

Alternative Inputs

Whilst the module is primarily designed to be triggered using the included infra red sensor, there are a number of different ways the module can be triggered.

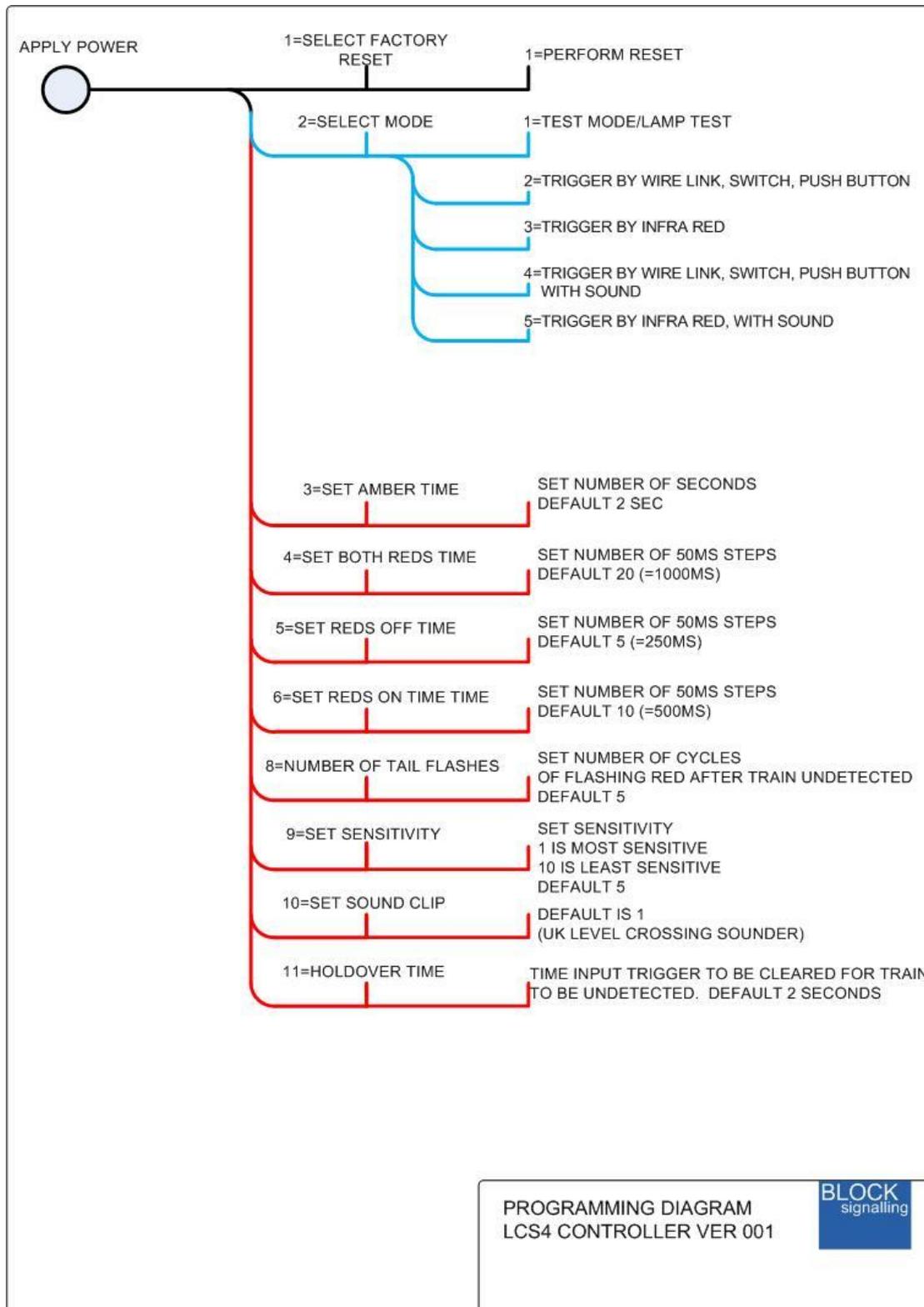
Some of these are shown in the diagram below.



1. When a push button is connected to terminals C and E, pressing the button will trigger the sequence. The sequence will time out once the sound clip has ended, unless the button is still pressed, in which case the flashing light part of the sequence will continue.
2. When a switch is connected to terminals C and E, closing the switch will trigger the sequence. The sequence will time out once the sound clip has ended, unless the switch is still closed, in which case the flashing light part of the sequence will continue.
3. As an alternative to a switch, a relay can be connected to C and E.
4. If there is a wire link fitted between the C and E terminals, the sequence will commence as soon as power is applied to the module and will continue until the power is removed.
5. As an alternative to the infra-red sensors, reed switches can be used. Multiple reed switches can be used to trigger the module from a number of tracks.
6. Multiple IR sensors can be used, wiring their IR emitters in series and their detectors in parallel. The sensitivity setting may need adjusting.
7. DCC accessory decoders commonly have a +12V DC supply available, and can switch their inputs down to ground. These can be used to operate the module, providing a link is made from C to E.

Programming Diagram

The following diagram shows all the programming options.



The module is supplied with an infra-red sensor and loudspeaker. Loudspeaker designs may vary.